



**US Army Corps  
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Engineer Research and  
Development Center

## Fort Campbell Childers House

Historic Maintenance and Repair Manual

Adam Smith, Jennifer Feucht, Megan Weaver Tooker  
and Sunny Stone

September 2006



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Final report

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**Abstract:** The Childers House is located at Fort Campbell, Kentucky (the house is located in Montgomery County, Tennessee). The Childers family built the house during the years of 1938 and 1939. The cultural resources firm of Dennison and O'Malley found the building ineligible for National Register of Historic Places (NRHP) nomination in 1977, determining that the house did not meet the NRHP Criteria. A more detailed report in the 1990s concurred with the 1977 evaluation; however, in 1997, the Tennessee State Historic Preservation Officer (SHPO) made a determination that the Childers House appeared to be eligible for listing on the NRHP under Criterion C: architecture due to a resemblance to Gunston Hall, Virginia. The Fort Campbell Integrated Cultural Resources Management Plan (ICRMP) recommended a complete documentation and re-evaluation of the building.

This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Fort Campbell Cultural Resources Office and Directorate of Public Work in managing this historic building.

All buildings, especially historic ones, require regular planned maintenance and repair. The most notable cause of historic building element failure and/or decay is not due to the fact that the historic building is old, but rather is caused by an incorrect or inappropriate repair and/or basic neglect of the historic building fabric.

Maintaining historic buildings and keeping a log of completed repairs and maintenance can help in:

- Reducing the cost of maintenance in the long run
- Increasing the life of the building and its elements
- The efficient use of the building and its elements
- Safety and security
- Compliance with Federal and DoD historic preservation regulations.

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## PREFACE

This study was conducted for the Cultural Resources Office in the Directorate of Public Works at Fort Campbell, Kentucky under project #131097. Funding was provided by Military Interdepartmental Purchase Request 21/2020/220/A/MIPR5LPWENV078/PO, dated 23 August 2005. The Fort Campbell technical monitor was Richard Davis, Cultural Resources Manager.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), U.S. Army Engineer Research and Development Center/Construction Engineering Research Laboratory (ERDC/CERL). The CERL Project Manager was Adam Smith. Dr. Dick Gebhart is Acting Chief, CN-C, and Dr. John T. Bandy is Chief, CN. The Director of CERL is Dr. Ilker R. Adiguzel.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC was COL Richard B. Jenkins and the Director of ERDC was Dr. James R. Houston.

## UNIT CONVERSION FACTORS

Multiply	By	To Obtain
acres	4,046.873	square meters
degrees Fahrenheit	$(5/9) \times (\text{°F} - 32)$	degrees Celsius
feet	0.3048	meters
gallons (U.S. liquid)	0.003785412	cubic meters
horsepower (550 ft lb force per second)	745.6999	watts
inches	0.0254	meters
miles (U.S. statute)	1.609347	kilometers
pounds (mass)	0.4535924	kilograms
square feet	0.09290304	square meters
tons (2,000 pounds, mass)	907.1847	kilograms
yards	0.9144	meters

# 1 MAINTENANCE PRIORITIES

## IN NEED OF IMMEDIATE ATTENTION:

- Gutters are improperly installed and water is traveling towards the house instead of away from it – ALL gutters, downspouts, and plastic piping be removed from the Childers House. Seamless gutters with leaf guards need to be installed on the house so that all water is moved away from the structure. It is recommended that the terra cotta piping system be rejuvenated so that the use of plastic piping is not necessary. See pages 165-172 for further instructions and images that show specific problem areas. (This action requires SHPO concurrence.)
- Landscaping – regrade soil around foundation to slope away from house. Before planting make sure the ground slopes away from the house at least six inches within the first ten feet around the perimeter of the house. Note that this is a minimum requirement and the greater the slope the better.
- The shrubs and trees are too close to the house. Shade from these plants leads to the development of mold and lichen growth. The root system of these plants is also impinging on the structure of the basement walls. The shrubs and trees need to be removed and replanted with era appropriate plants that will not disturb the basement walls. Please see pages 37- 45 for a list of acceptable shrubs and landscaping plan.
- The large tree on the north needs to be trimmed back so as not to infringe on the architectural elements and to let more light permeate to the ground and on to the brick facade.

## OTHER ISSUES:

- Mold and lichen needs to be removed from bricks, brick and mortar cleaned, and mortar repointed. - Care should be taken in the repair of the brick walls with materials as near to the original color as possible and with similar mechanical properties as the original brick and mortar. Please see pages 47-78 for further instructions on the care of brick and images of specific problem areas.
- Original green shutters are missing and should be replaced in-kind. Please see page 24 for an image of an original shutter. (This action requires review by a qualified historic architect.)
- Remove the aluminum covering wood elements and window trim on exterior of house and repaint the surfaces below. Please see pages 159-164 for images and more information on this issue. (This action requires review by a qualified historic architect.)
- Chimneys - remove inappropriate chimney cap on South chimney, clean soot stains on bricks, repair deteriorated mortar, remove mold and lichen growth on chimneys. See pages 50-53 for images that show specific problem areas.
- Concrete walls and flooring in basement need attention - Water/moisture infiltration is a problem. There are also cracks in the foundation and under the stairs. Spalled areas on the various concrete elements should be patched with a mortar

compound that is like in both appearance and mechanical properties. Also treatment of the foundation wall is needed for mold, lichen, and efflorescence. Please refer to pages 79-102 for more information on repairing concrete.

- Roof - Remove leaves from porch roof. There is also an improper connection between three-tab asphalt shingles and rolled asphalt roofing on screened porch roof. Another problem area is the caulking on roof tiles below the dormer. For more information on the care of the roof and images of problem areas please see pages 103-117.
- Fix flashing problems at the base of the rear shed dormer. Please see pages 106-107 for images of problem area.
- Doors - The door between the screened porch and living room should be replaced with a historically sensitive door. The two garage doors should also be replaced with historically sensitive doors. Please refer to pages 119-128 for more information and images of doors. (This action requires SHPO concurrence.)
- Clean rusty hinges and hardware on doors. For images of the hardware please see pages 145-148 for exterior hardware and 207-208 for interior hardware.
- Railings should be cleaned and sealed to prevent further deterioration. For further information on railing maintenance and images of the railings, please see pages 149-157.
- Replace exterior light fixtures with historically accurate fixtures. For images and more information on lighting, please see pages 173-174 for exterior lighting and 203-206 for interior lighting. (This action requires SHPO concurrence.)
- Plaster is cracked and/ or damaged in areas throughout house – any repair or maintenance of the plaster should be executed by a qualified professional. For more information on plaster repair and images of problem areas, please see pages 209-218.
- Patio - needs to be rebuilt so that water is shed away from the building; however, most of the bricks are in excellent condition and just need to be reset once the patio substructure is accurately constructed. Please see pages 54-57 for images and more information on the patio. (SHPO should review plans for patio reconstruction.)

The Childers House Manual should be consulted for further instructions on maintenance issues and treatments and referred to for images of specific problem areas. In addition to these specific issues, general cleaning and maintenance should be undertaken on a regular basis. Please refer to this manual for instruction and information regarding general cleaning and maintenance for all other elements.

## 2 STAGE I—GENERAL INFORMATION

### BACKGROUND

The Childers House historic building maintenance and repair program is based on three successive steps, with each step providing a foundation for the next level. Stage I is the identification and documentation of the historic building and classification of the building so that it may be compared to others. Stages II and III provide additional levels of documentation within the building. Stage II allows the identification and prioritization of significant interior and exterior areas, or zones. Stage III identifies and rates the significant architectural elements of each zone, as well as providing maintenance and repair instructions, where deficiencies exist.

An architectural historian and historic architect gathered the building data through field inspections. The researchers then compiled this data into the three stages described below. The stages are:

Stage I is the general identification information, including the background material necessary to establish a "frame of reference" for the building. It includes data on location, identification, size, codes, and related programs.

Stage II allows the organization of the building into one or more zones, or areas of varying importance for historical and architectural reasons. Stage II contains descriptive information plus photographs and drawings to identify the areas.

Stage III contains the identification, evaluation, and description of individual architectural features or elements within each zone established in Stage II. Stage III also identifies deficient elements and provides work recommendations and cost estimates to correct these deficiencies. The elements are organized into several divisions, such as Exterior, Interior, or Electrical. It is the data in Stage III, which is most applicable to the maintenance, repair, and rehabilitation of the building.

The data collected by the Childers House maintenance and repair program is reported in this document. It is organized into two parts: graphic documentation and written information. The graphic portion consists of photographs and floor plans of the building as it existed at the time of the inspection, plus the zoned building plans. The written portion consists of the various elements of the building and potential repair/replacement options guided by the Secretary of the Interior Standards.

### GENERAL INFORMATION

LOCATION: On Mabry Road, Fort Campbell, Montgomery County, Tennessee

USGS Woodlawn, Tennessee, United States Quadrangle,

Universal Transverse Mercator Coordinates: Zone 16  
Easting 454204  
Northing 4053308

PRESENT OWNER: Department of Defense  
Department of the Army  
Fort Campbell, KY 42223

ORIGINAL USE: Residence

PRESENT USE: Office

DATE OF CONSTRUCTION: circa 1938

SIGNIFICANCE:

A contractor for Fort Campbell declared the Childers House ineligible for the National Register in 1977. The Tennessee State Historic Preservation Officer (TN SHPO) reversed this finding of ineligibility in 1997. The TN SHPO determined that the Childers House was eligible for the National Register under Criterion C: Architecture since it appears Gunston Hall in Mason Neck, Virginia was the model for the design of the Childers House.

BUILDING NUMBER - 6081

NR - Eligible

HABS/HAER - None

DESCRIPTION:

The Childers House (Building 6081) is a one-and-one-half story residential building constructed of brick masonry. The roof has a side-gabled form with three front-gable dormers on the front and one large shed dormer on the back. The windows are eight-over-eight, vinyl, double-hung on the first floor and six-over-six, vinyl, double-hung on the second floor. The west (primary) facade of the Childers House is symmetrical with a centered six-paneled door. A poured concrete stair and pedimented, covered, front porch leads to the door from the circle drive. There is a screened porch on the south side creating an asymmetrical facade overall. The main portion of the house has two chimneys, one located at each end of the house. The south facade is asymmetrical with the screened porch, double dining room windows, and a kitchen wing elevation. The east facade is asymmetrical as the kitchen wing dominates the facade. The north facade is also dominated by the kitchen wing and shows the garage located below the kitchen.

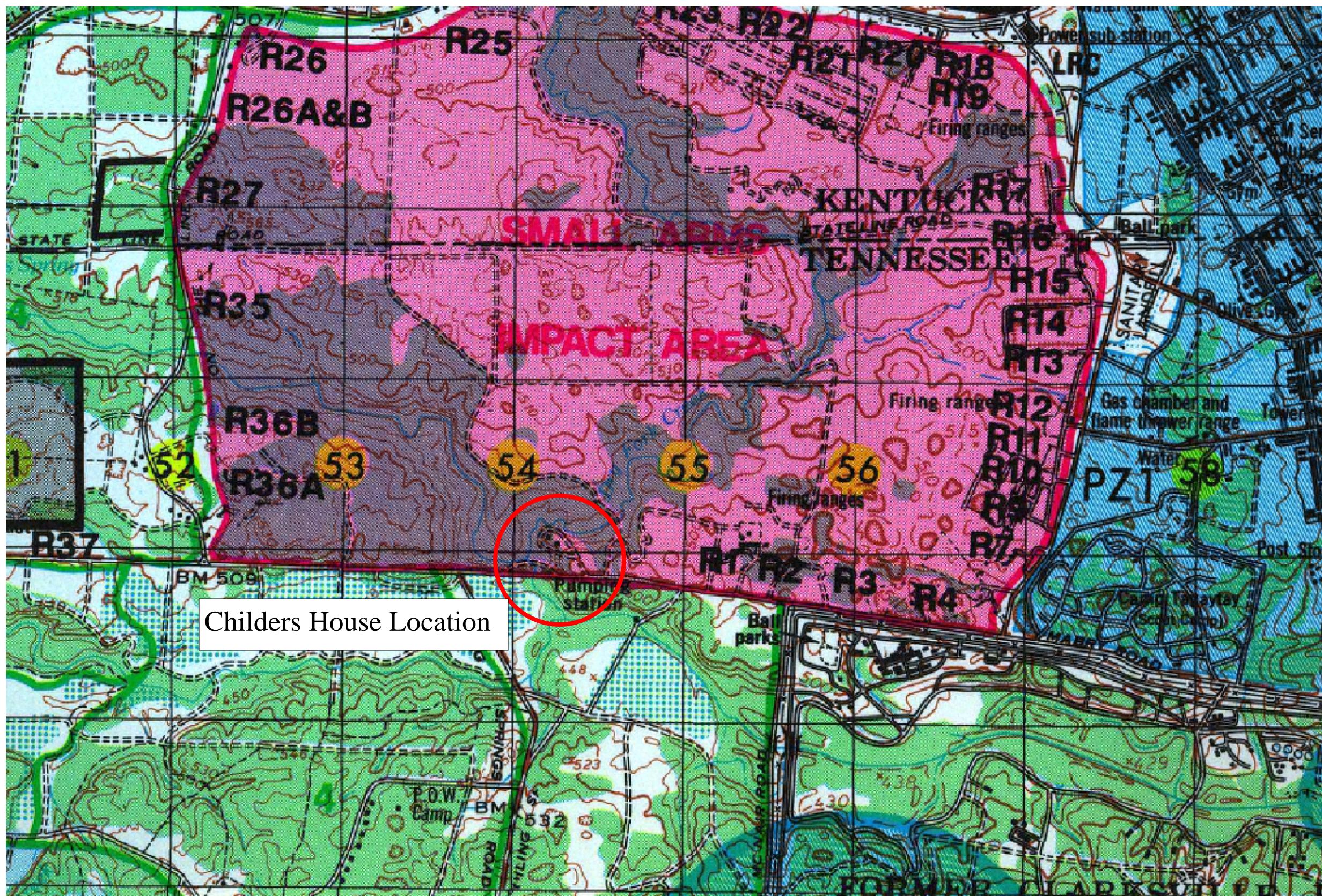


Figure 1. Location of Childers House (courtesy of Cultural Resources, Fort Campbell).

## 3 STAGE II – BUILDING ZONES

Building zones establish the framework for planning for the operation, maintenance, and rehabilitation of an individual building by dividing the building into logical areas consistent with their use, original design, public access, and integrity. The concept of zoning, while establishing a logical framework, is also consistent with techniques of original architectural programming, design, and construction.

The zoning of the building identifies the differences between more and less significant interior and exterior building areas and assigns a numerical rating, or level, to each zone. The zone ratings establish management and treatment requirements for each zone, i.e., highly significant public spaces may be in a "preservation zone" where maintenance is tightly controlled and replacements are restricted. At the other end of the spectrum, larger, more private work areas may be subject to normal maintenance and open to a much broader range of architectural modification. The treatment guidelines for each level convey the general principles of preservation to be applied within the zone.

### SUMMARY OF ZONES

Level 1 - Preservation Zone (Red)

Level 4 - Free Zone (White)

Level 2 - Preservation Zone (Yellow)

Level 5 - Hazardous Zone (Black Outline)

Level 3 - Rehabilitation Zone (Green)

Level 6 - Impact Zone (Red Stripes)

**The Childers House, Building 6081, has six zones.**

### LEVEL 1 - PRESERVATION ZONE (RED)

Areas, both in plan and elevation, that exhibit unique or distinctive qualities, original materials or elements, or representative examples of skilled craftsmanship, work of a known architect or builder, or are associated with a person or event of preeminent importance.

Level 1 areas may be distinguished from Level 2 areas by concentrations of detailing or "richness" of finish material and detail.

**EXAMPLE:** Spaces or areas of a building representing the highest degree of detailing and finish level, such as the main lobby or public spaces in an office building or public building, the foyer and parlors of a historic residence, the offices of the most "important" tenants within a building or space, assembly spaces such as a courtroom or a library read-

ing room, parlor, etc., or the primary building facade(s), i.e., that facade which is the most visible to the public.

**GUIDELINE:** The character and qualities of this zone should be maintained and preserved as the highest priority.

The area of significance is architecture. The Childers House is an excellent example of early 20<sup>th</sup> century colonial revival architecture, and it is one of the few examples of this style of architecture in this rural area of Tennessee and Kentucky.

Overall, the west (front) facade is a Level 1 (Preservation Zone), the windows are a Level 4 (Free Zone), and the aluminum covered wood details and missing shutters are a Level 6 (Impact Zone). Areas that need the most attention are the front facade and chimneys, as well as improperly installed gutters and downspouts. These areas are of significant historic value and Directorate of Public Works (DPW) should maintain them. Mold and lichen growth needs to be removed from the brick and mortar, the brick and mortar cleaned, and the mortar repointed to prevent further deterioration. Any missing elements, such as the green shutters should be replaced in-kind. Care should be taken in the repair of the brick walls with materials as near to the original color as possible and with similar mechanical properties as the original brick and mortar. Areas that need attention on the Childers House are, but not limited to, the brick walls and mortar; the asphalt roof; the chimneys and their components; and the overgrown vegetation.



**Figure 2. West (front) facade.**



Figure 3. North facade.



Figure 4. North (garage/kitchen) facade.



Figure 5. East (garage/kitchen) facade.



Figure 6. South (garage/kitchen) facade.



Figure 7. South facade.

## LEVEL 2 - PRESERVATION ZONE (YELLOW)

Areas exhibiting distinguishing qualities or original materials and/or features, or representing examples of skilled craftsmanship.

**EXAMPLE:** Areas generally with a lower density of original materials and detailing than the primary spaces rated Level 1. These may include circulation spaces, secondary offices, smaller meeting rooms, etc., and side elevations or elevations that are less subject to public view.

**GUIDELINE:** Every effort should be made to maintain and preserve the character and qualities of this zone.

The central hallway, staircase, living room, dining room, first floor bathroom, upstairs fireplace, and second floor bathroom are all Level 2. These elements need to be checked annually and cleaned annually or bi-annually as necessary.



Figure 8. Foyer.

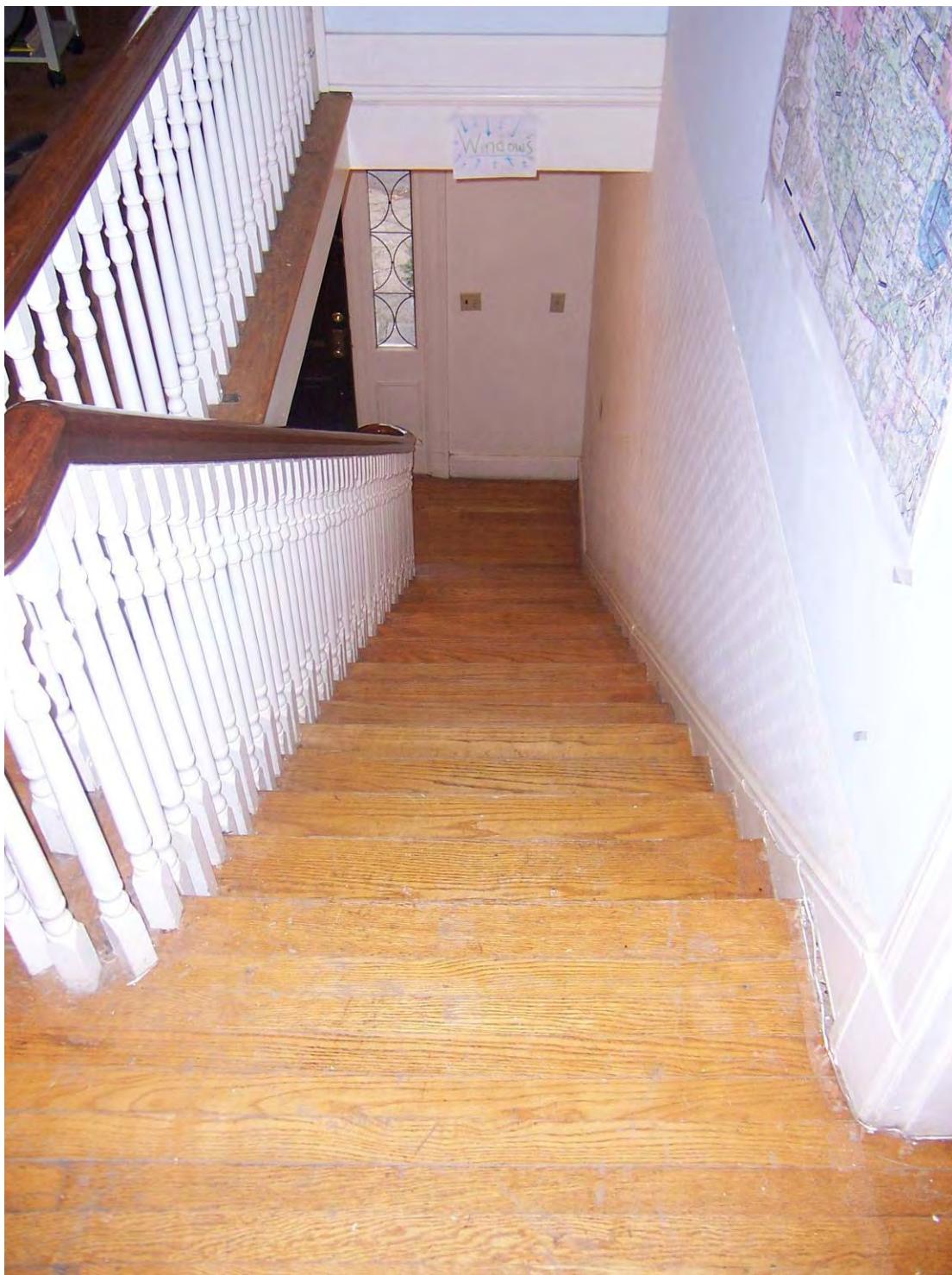


Figure 9. Stairs.



Figure 10. Fireplace in living room.



Figure 11. Original six panel wood doors with original trim downstairs bedroom.

## LEVEL 3 – REHABILITATION ZONE (GREEN)

Areas which are more modest in nature, with a lower density of highly significant features, material or conditions, but which may be original and exhibit distinctive architectural character and retain substantial integrity.

EXAMPLE: Secondary and tertiary spaces generally including minor circulation areas, such as kitchens, work rooms, areas generally out of public view, and rear elevations which are less visible or have reduced integrity.

GUIDELINE: Undertake all work in this zone as sensitively as possible. However, contemporary methods, materials, and designs may be selectively incorporated, as long as original character and integrity are respected and maintained.

The original kitchen, the hyphen butler's pantry, and the patio are Level 3. Generally, these elements are in good condition and just need annual cleaning. The patio needs to be rebuilt so that water is shed away from the building; however, most of the bricks are in excellent condition and just need to be reset once the patio substructure is accurately constructed.

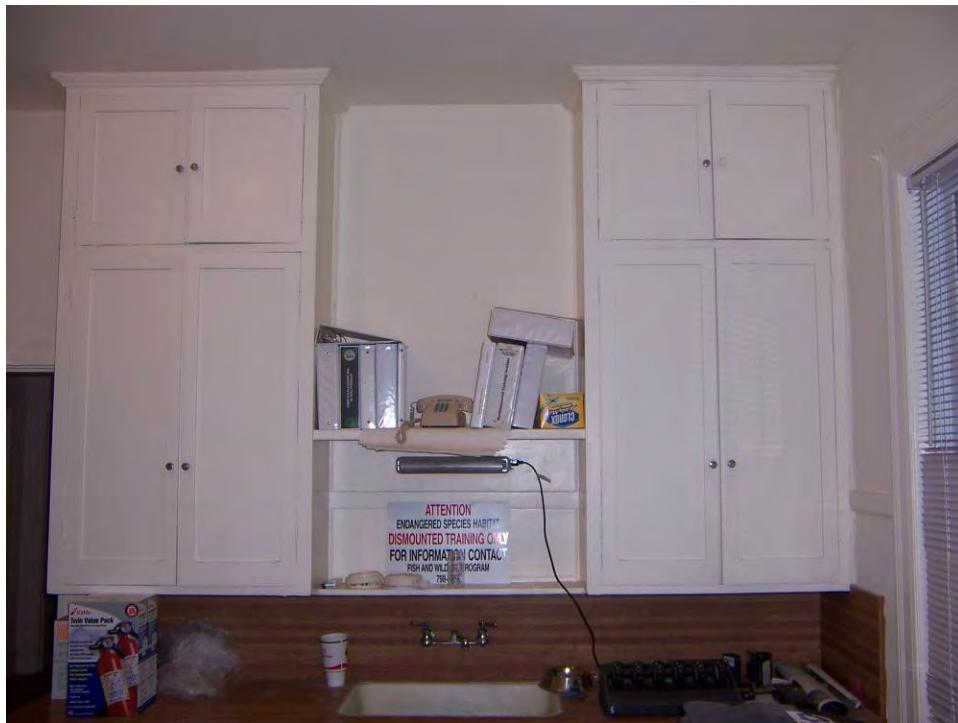


Figure 12. Upper cabinets in original kitchen.



Figure 13. Lower cabinets in original kitchen.

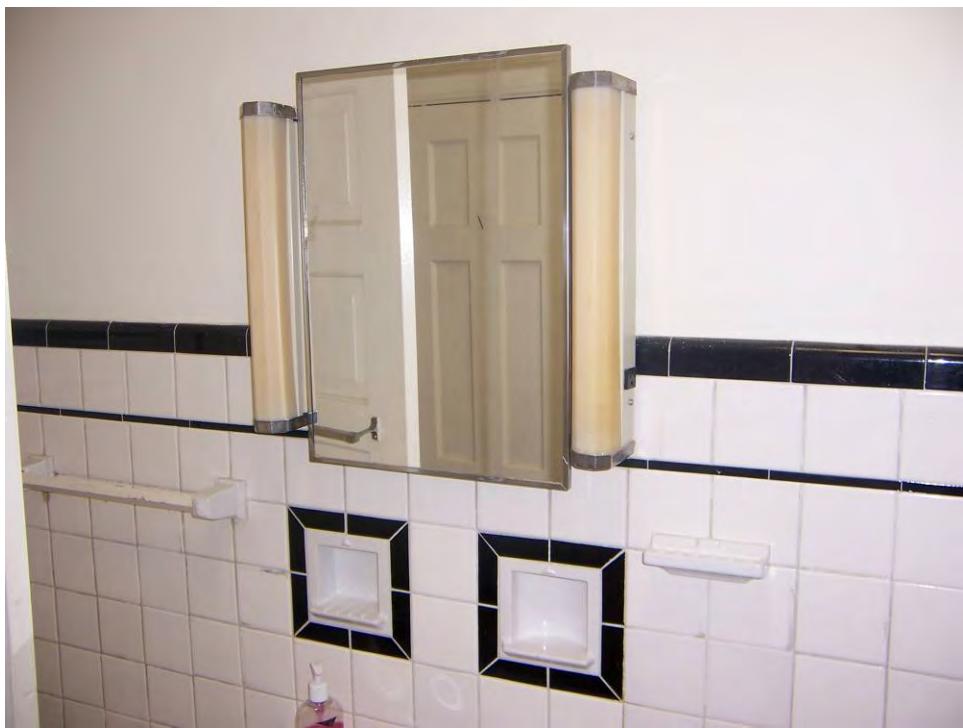


Figure 14. Original tile work in first floor bathroom.



**Figure 15.** Original tile floor in first floor bathroom.



Figure 16. Original cabinets with original handles in hyphen that connects the kitchen addition to main portion of the house.



Figure 17. Original tile work and sink second floor bathroom.

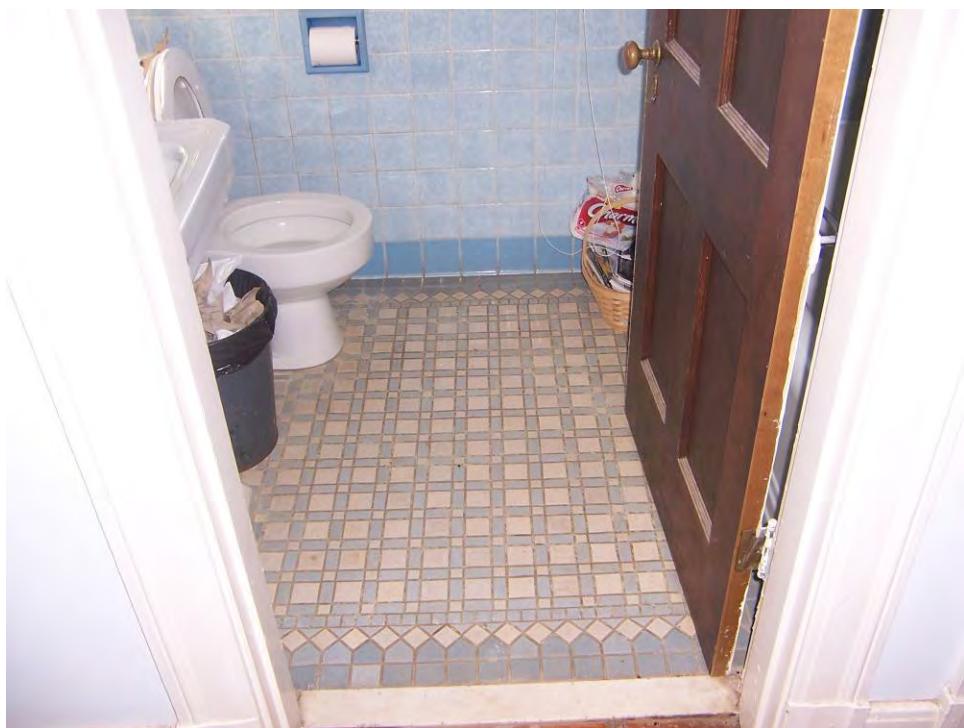


Figure 18. Original tile floor second floor bathroom.



Figure 19. Fireplace in second floor bedroom.

#### **LEVEL 4 – FREE ZONE (WHITE)**

Areas not subject to the above three categories and whose modification would not represent loss of character, code violation, or intrusion to an otherwise historically significant structure.

**EXAMPLE:** Generally undistinguished repetitive areas such as open offices, non-public living and work areas, hotel rooms, and elevations of newer additions to historic buildings that are not already significant in themselves.

**GUIDELINE:** Treatments in this zone, while sympathetic to the historic qualities and character of the building, may incorporate extensive changes or total replacement through the introduction of contemporary methods, materials and designs; however, sensitive design practices should always be applied in work within, or adjacent to, historic properties.

The interior of the kitchen addition, the entire basement area, the interior of the garage addition, and the offices in the former bedrooms are Level 4; however, original wood elements located in these areas such as doors and millwork need to be preserved.

#### **LEVEL 5 – HAZARDOUS ZONE (BLACK OUTLINE)**

Areas exhibiting hazardous materials or conditions.

**EXAMPLE:** Exposed materials such as asbestos, flammable liquids, or lead paint. Hazardous conditions such as high voltage equipment (transformers), elevator equipment, and exhaust fans. Required exit through a mechanical room.

**GUIDELINE:** Special treatments in this zone are probably not required.

There are no hazardous zones.

## **LEVEL 6 – IMPACT ZONE (RED STRIPES)**

Areas that are improperly used and may result in code violations, or areas insensitively adapted, resulting in a general loss or concealment of character, and/or loss or obscuring of significant historic fabric or features. Adequate existing fabric must be available to support or provide guidance for the rehabilitation of the zone and the restoration of the character of the original area. These areas are striped red on the elevations.

**EXAMPLE:** Corridor walls constructed from non-rated materials creating potential fire hazard. Large stylistically distinctive public spaces such as a lobby or ballroom which has been subdivided into smaller spaces using full height permanent partitions and which results in loss of character, spaces which have been insensitively rehabilitated using modern materials such as pre-finished wall panels over original decorative materials, or important elevations which have been insensitively modified.

**GUIDELINE:** Deficiencies in this zone should be corrected and loss of character, fabric, and/or features should be mitigated where possible.

The aluminum covering the wood architectural elements on the west (front) facade and the missing shutters are all Level 6.



Figure 20. Aluminum covering original porch columns, fascia, and ceiling.



Figure 21. Aluminum covering of elliptical pediment and keystone.



Figure 22. Original shutter found in upstairs bedroom closet.



Figure 23. Aluminum covering of sidelight wood panel.



Figure 24. Aluminum covering of pilasters on dormer windows.



Figure 25. Childers  
House First Floor  
Building Zone  
Diagram.

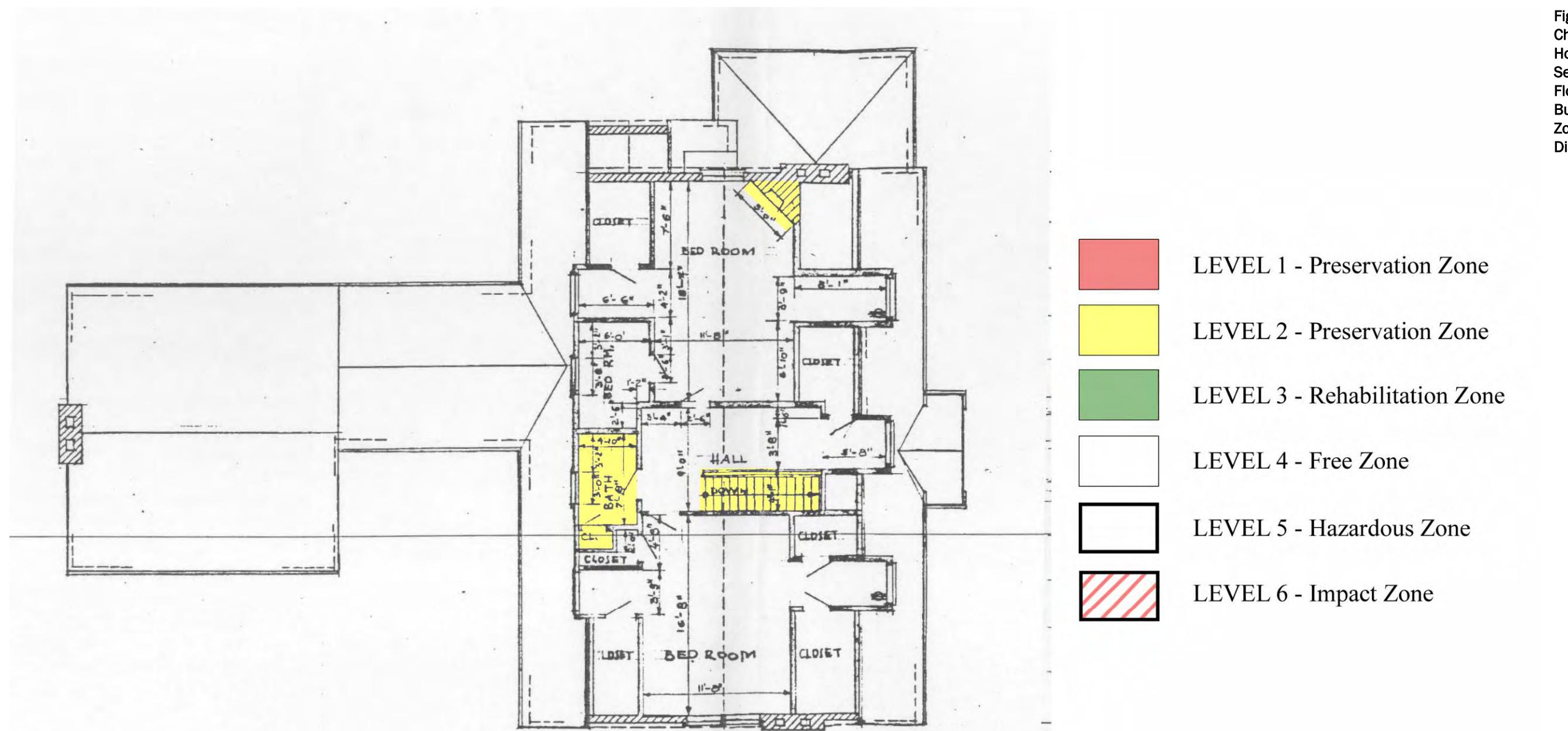


Figure 27.  
Childers  
House  
Basement  
Building  
Zone  
Diagram.

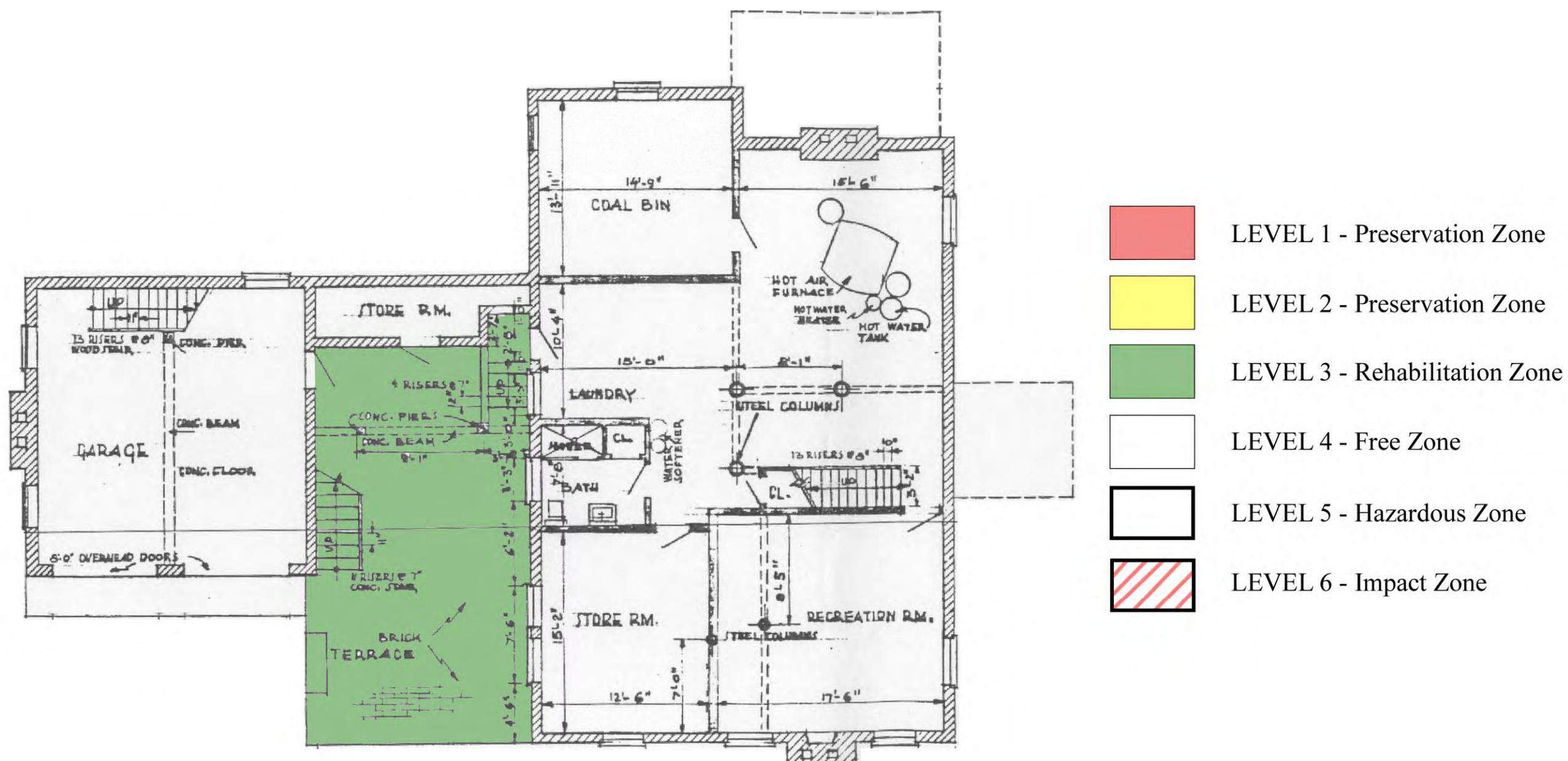


Figure 28.  
Childers  
House Front  
Elevation  
Building  
Zone  
Diagram.



Note: The lintels over the four 1st floor windows are a Level 6  
All windows are a Level 4

## 4 STAGE III—ELEMENT REPORT

### GENERAL ASSESSMENT

**There are specific trouble areas for the Childers House, which need to be addressed as soon as possible, should be more closely inspected, and/or more rigidly maintained.**

The overall element conditions for the Childers House are good, except where identified in the report. The area and general problems of particular concern are:

#### **BRICK MASONRY WALLS**

The exterior of the Childers House is red brick and tan mortar. All masonry areas will need maintenance, as surfaces have become covered with mold and lichen.

#### **ROOF**

The roof of the Childers House is in generally good condition. Some staining has occurred due to decomposing leaves remaining on the roof while they are decomposing, but this does not damage the roofing material.

#### **GUTTERS**

The gutters and downspouts are in poor condition and in many cases incorrectly installed on the house. This leads to water traveling towards the house instead of away from it. All gutters and downspouts need to be removed and correctly installed.

#### **SITE AND LANDSCAPE**

The shrubs and trees are too close to the house. Shade from these plants leads to the development of mold and lichen growth. The root system of these plants is also impinging on the structure of the basement walls. The shrubs and trees need to be removed and re-planted with era appropriate plants that will not disturb the basement walls.

### GENERAL INFORMATION

**Preservation:** Defined as the act or process of applying measures to sustain the existing form, integrity, and material of a building or structure.

The Element Report is the first part of the inventory and condition assessment and provides an inventory of the materials, components, and systems found within the building. The inventory and condition assessment is organized into seven categories or divisions. These include site, exterior, interior, foundation, furnishings, utilities/systems, and

fire/life/health safety. An element may be an architectural feature, structural component, engineering system, or functional requirement. For each element found within the building, a number of aspects are reported.

Maintenance personnel should be particularly concerned with the specific treatments associated with each numerical value, i.e., that a #1 rated element must be preserved, or that a #3 rated element should be preserved if at all possible, but if it must be replaced, modern materials are acceptable when used in a manner sympathetic to the historic character of the building. The classification levels and corresponding treatment standards are intentionally general at the building level. Their purpose is to heighten awareness, guide management, prevent unnecessary (potentially irreversible) damage, and promote sensitive management and maintenance. The treatment ratings for individual elements are as follows:

## SITE

### GROUNDS

Building 6081 – The Childers House faces roughly northwest. It sits at the end of a long asphalt driveway that has its entrance off Mabry Road. The driveway splits into a loop halfway between Mabry Road and the house. The driveway loop circles around the house to the northeast, northwest and southwest, and it divides the house from a steep drop to a streambed below.



Figure 29. Front facade that faces driveway and streambed.

### TREATMENT RATING 2: PRESERVE WHEREVER POSSIBLE

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE  
REPLACED IN-KIND.

#### Statement of Importance:

The site and landscape makes a significant contribution to the property's historic appearance as a colonial revival house.

#### Condition: *Poor – Replace*

Fair to good - Preserve

Poor - Replace

### INVENTORY QUANTITY AND CONDITION

The site is evaluated as Poor when:

- the grounds are not well maintained, and
- the front concrete walks are not in good condition or clear of overgrown plantings, and
- large gravel and slight slope support soil drainage, but are promoting the deterioration of the base of the building as a direct result of water splashing off the gravel.

Minor deficiency of the site exists where:

- All walks are not kept clear of debris and overgrown plantings, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

## **MAINTENANCE / MANAGEMENT GUIDELINES FOR SITE**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

### **HISTORIC PRECEDENT**

Colonial Revival became a very popular house style between World War I and World War II. Characteristics include an orderly symmetrical relationship between windows, doors, and building masses with simplified versions of classical architectural details and classical orders at the entry. The style was spread across America in pattern books, catalogues, and popular magazines.

In the 1920s and 30s, foundation plants were used to create a transition between the vertical lines of the house and the horizontal lines of the ground, to accentuate, to decorate and to soften the lines of the house and to relieve the bareness of the foundation walls (Grant 1954, 132). Correct planting is aimed not to bury the house in greenery, but rather to accentuate the architectural detailing (*House Beautiful* 1927, 50). For example, tall, pyramidal evergreens were planted adjacent to doorways, columns, and porches.

It was important to keep the foundation planting in scale with the house, therefore one-story homes need less “tying” to the ground than multi-story homes (Grant 1954, 132). In addition, the planting should match the style and materials of the house. Formal, classical-style homes with symmetrical features have a strong presence and any planting should not compete with the architecture. On the other hand, brick homes need a heavier planting, preferably of bold-textured, broad-leaved evergreens than a frame house (Grant 1954, 136).

As Leonard H. Johnson noted in his designs for his 1927 book, *Foundation Planting*, evergreen plantings look great when first planted but need maintenance over the years to keep their size balanced. It was general practice that herbaceous plants or deciduous shrubs were not desirable in foundation planting because they leave unsightly gaps in winter (Grant 1954, 136). Nevertheless, as noted in a *House Beautiful* article in 1937, while evergreens are important for all-season color, stability in the design, and background quality of the deciduous and flowering shrubs, both evergreen and deciduous plants must be used for variety.

Historic sources, such as plan books, catalogues, and popular magazines were studied for examples of foundation plantings in similar style homes and it was found that most:

- Consisted of primarily evergreen species,
- Were symmetrical in form,
- Had typically two specimen of plants, either pyramidal or round in habit that flanked the front door or entryway,
- Other rounded or pyramidal specimens were located at the corners of the house,
- Plantings were formal and tight, and
- Low shrubs or groundcovers were planted under windows across the front facade and along sides.

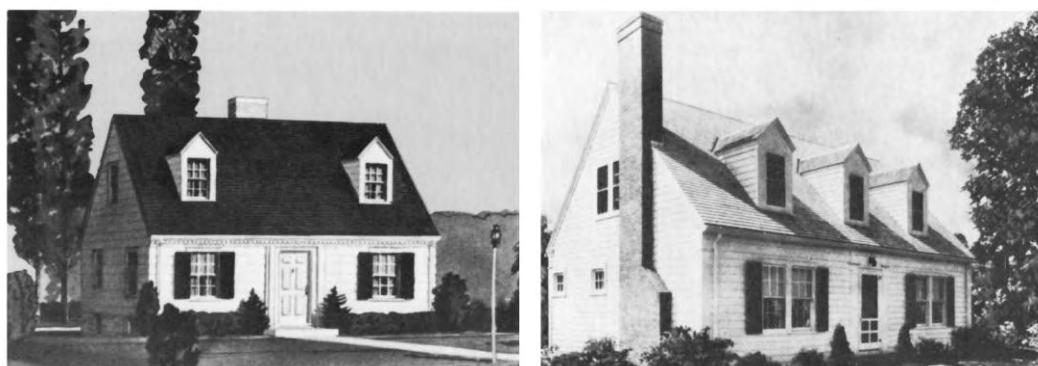


Figure 30. Sears Roebuck and Company homes; Nantucket (1939) on the left and Gordon (1931-3) on the right.

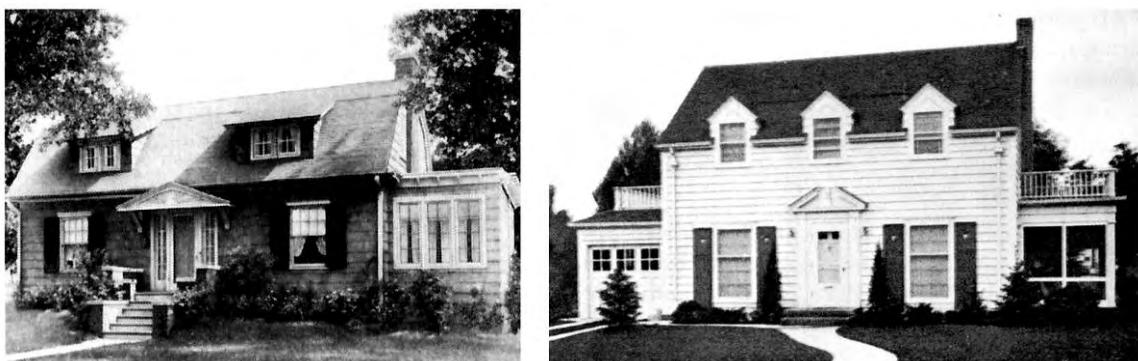


Figure 31. Homes pictured in *Home Builders Catalog* (1927) on left and *Plan Service Company* design #407 on right.

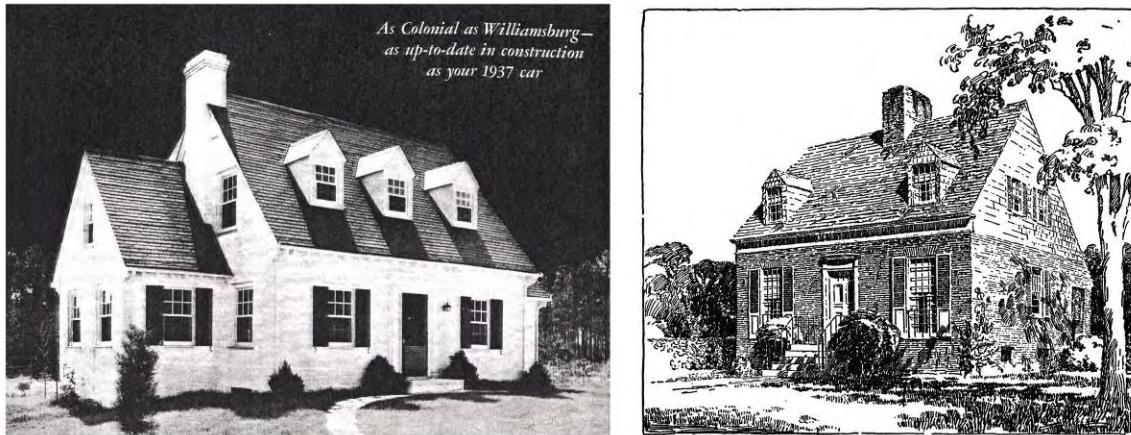


Figure 32. Homes pictured in an advertisement in a 1937 *House Beautiful* Magazine and in the *Chicago Tribune Book of Homes* (1927).

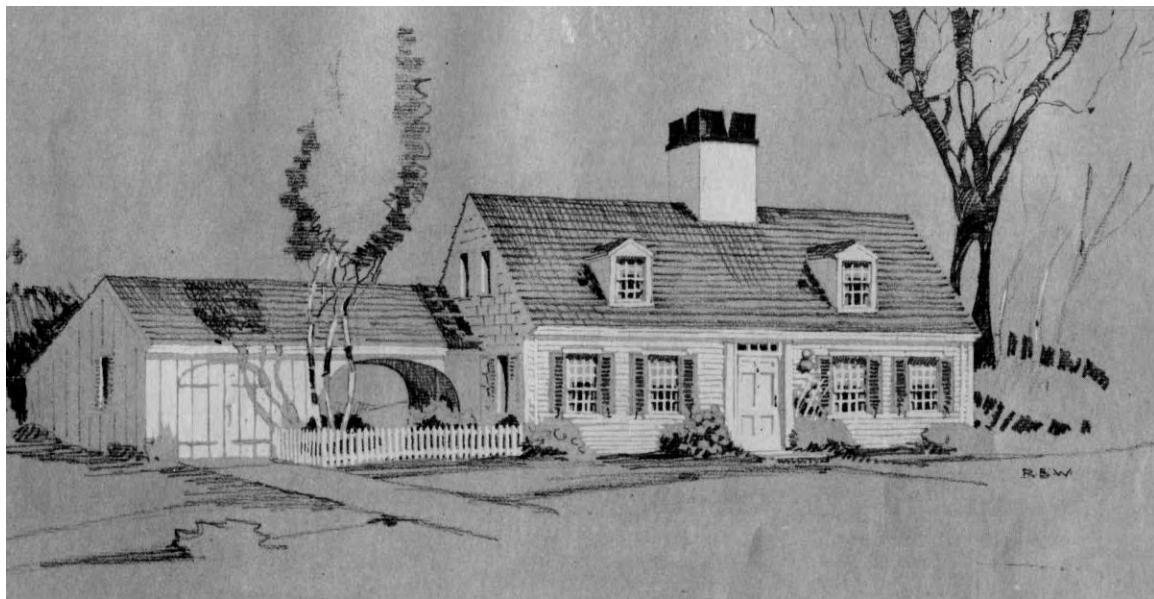


Figure 33. House design by Royal Barry Willis in his 1945 book, *Houses for Homemakers*.

### **REPLACE**

All of the shrubs in front of the house need to be removed to protect the structure and architectural elements of the house.

The large tree on the north needs to be trimmed back so as not to infringe on the architectural elements and to let more light permeate to the ground and on to the brick facade.

### *Recommended*

Replacing deteriorated or damaged landscape features with historically accurate landscape features.

### *Not Recommended*

Adding conjectural landscape features to the site such as period reproduction lamps, fences, fountains, or vegetation that is historically inappropriate, thus creating a false sense of historic development.

### **PLANT LIST**

Below is a list of shrubs for use in replacing the foundation plantings at the Childers House. This list was generated from species typically used for foundation plantings in the 1930s, although substitutions of similar species and cultivars were made to decrease required maintenance and were selected based on current availability in the trade. For example, today there are plant cultivars available that are smaller and more compact in form to eliminate trimming.

This list was based on articles in *House Beautiful Magazine* (1936-7), Adams's *Restoring American Gardens; An Encyclopedia of Heirloom Ornamental Plants 1640-1940*, and *The House Beautiful Gardening Manual* (1926).

**Table 1. List of Acceptable Plants.**

Scientific name	Common name	Size	Habit	Characteristics
<i>Berberis thunbergii</i> 'Aurea'	Golden Japanese Barberry	Height 2-4', Spread 2-4'	rounded	bright lime green foliage
<i>Berberis thunbergii</i> 'Kobold'	Kobold Japanese Barberry	Height 2-4', Spread 2-4'	rounded	rich green foliage, red berries in fall
<i>Buxus</i> 'Green Mountain'	Green Mountain Boxwood or	Height 3-5', Spread 2-4'	upright, pyramidal	evergreen
<i>Buxus</i> 'Green Velvet'	Green Velvet Boxwood	Height 2-3', Spread 2-3'	low, rounded	evergreen
<i>Calycanthus floridus</i> 'Athens'	Carolina Allspice	Height 4-6', Spread 4-6'	compact rounded	fragrant light yellow flowers in May and yellow, fall color
<i>Chaenomeles speciosa</i>	Flowering Quince	Height 2-4', Spread 3-5'	broad rounded and spreading	many cultivars, stunning flower display in spring
<i>Chamaecyparis obtusa</i> 'Nana Gracilis'	Dwarf Hinoki False-cypress	Height 4-6', Spread 3-4'	pyramidal	dark green evergreen foliage
<i>Chamaecyparis obtusa</i> 'Nana Lutea'	Dwarf Golden Hinoki Falsecypress	Height 2-4', Spread 2'	pyramidal	frosted with gold foliage
<i>Chamaecyparis obtusa</i> 'Pygmaea Aurescens'	Bronze Hinoki False-cypress	Height 2' to 4', Spread 4' to 6'	broad rounded	bronze fall color
<i>Clethra alnifolia</i> 'Hummingbird'	Hummingbird Clethra	Height 2-4', Spread 2-4'	compact rounded	fragrant, white flowers

Scientific name	Common name	Size	Habit	Characteristics
<i>Deutzia gracilis</i> 'Nikko'	Nikko Deutzia	Height 18-30", Spread 4-6'	spreading	white flowers in late spring, deep burgundy fall color
<i>Hydrangea macrophylla</i> or <i>serrata</i>	Big leaf Hydrangea	Height 3-5', Spread 3-5'	broad rounded	blue or pink flowers in mid-summer.
<i>Hydrangea arborescens</i> 'Annabelle'	Annabelle Hydrangea	Height 3-4', Spread 3-6'	broad rounded	large, snowball-like white flowers in summer.
<i>Ilex glabra</i> 'Compacta' or 'Nordic'	Compact Inkberry Holly	Height 3-5', Spread 3-5'	upright, oval	excellent for foundations, hedges and massing.
<i>Juniperus sabina</i> 'Broadmoor'	Broadmoor Savin Juniper	Height 1' to 2', Spread 4' to 6'	spreading	a fine-textured, mounded spreader, bright green
<i>Pachysandra terminalis</i>	Pachysandra	Height 6-8", Spread 9-12"	low growing	an evergreen ground cover
<i>Pinus mugo</i> 'Slow-mound"	Slowmound Mugo Pine	Height 3-5', Spread 3-5	broad-rounded	dwarf with dense, dark green foliage.
<i>Prunus glandulosa</i>	Dwarf Flowering Almond	Height 3-5', Spread 3-4'	broad rounded and leggy	pink or white showy flowers in April
<i>Rhododendron</i> 'Cultivars'	Evergreen Azaleas	Height 2-5', Spread 2-5'	rounded	glossy green evergreen foliage, showy flowers late April to late May
<i>Spiraea japonica</i> 'Anthony Waterer'	Anthony Waterer Spirea	Height 2-3', Spread 2-4'	rounded to broad rounded	bright rose-pink flowers from June to September
<i>Spiraea thunbergii</i>	Baby's breath Spirea	Height 1'-2', Spread 2'-4'	rounded	showy, graceful shrub
<i>Spiraea x vanhouttei</i> 'Snow White'	Snow White Vanhoutte Spirea	Height 4'- 6', Spread 4'-6'	rounded	compact form, white flowers spring
<i>Spiraea x bumalda</i> 'Magic Carpet'	Magic Carpet Bumald Spirea	Height 1'-2', Spread 2'-4'	rounded	new growth is bright orange changing to chartreuse; finally red fall color; deep purple-pink flowers in late spring.
<i>Taxus x media</i> 'Taunton'	Taunton Yew	Height 3-4', Spread 4-6'	broad-rounded	a low, spreading, graceful form that is resistant to winter burn
<i>Thuja occidentalis</i> 'Hetz Midget'	Hetz Midget Arborvitae	Height 3-4', Spread 2-3'	rounded	evergreen
<i>Thuja occidentalis</i> 'Holmstrup'	Holmstrup Arborvitae	Height 3-6', Spread 2-3'	pyramidal	evergreen
<i>Viburnum carlesii</i> 'Cayuga' or 'Compactum'	Koreanspice Viburnum	Height 3-5', Spread 3-6'	rounded, broad rounded	very fragrant white flowers in early spring and fall color

Scientific name	Common name	Size	Habit	Characteristics
<i>Viburnum trilobum</i> 'Compactum'	Compact American Cranberrybush Viburnum	Height 4-5', Spread 3-4'	dense rounded	white flowers in May and June are followed by red fruit; glossy green foliage turns red to purple in fall
<i>Vinca minor</i>	Vinca	Height 4-6", Spread 9-14"	low growing	a spreading, evergreen ground cover
<i>Weigela florida</i> 'Variegata'	Variegated Weigela	Height 3-5', Spread 3-5'	rounded	green leaves edged in a creamy white with pink blossoms late spring

### DESIGN RECOMMENDATIONS

- Choose plants based on their mature sizes. While many shrubs can be carefully pruned to maintain smaller sizes, they require continued maintenance and effort. Using plants that are the correct size at maturity will eliminate this maintenance.
- Choose plants with a variety of habits to prevent monotony. In addition, choose plants that do not need trimming to keep their form to cut down on maintenance.
- In addition, pick a variety of both deciduous and evergreen trees, so that some trees will flower in the summer and others will keep their color through the winter.
- Vary the texture of the plants used for interest.
- Since neatness was an important characteristic in the 1930s, choose plants and cultivars with this trait.
- After looking at mature spread, plant shrubs at least a foot or two away from the house and foundation to prevent damage to house facade.
- To prevent drainage issues, before planting make sure the ground slopes away from the house at least six inches within the first ten feet around the perimeter of the house. Note that this is a minimum requirement and the greater the slope the better.
- Ideally, foundation plants should be planted in one continuous bed for ease of maintenance.

### Planting Plan

A planting plan using the recommended plants is included below.

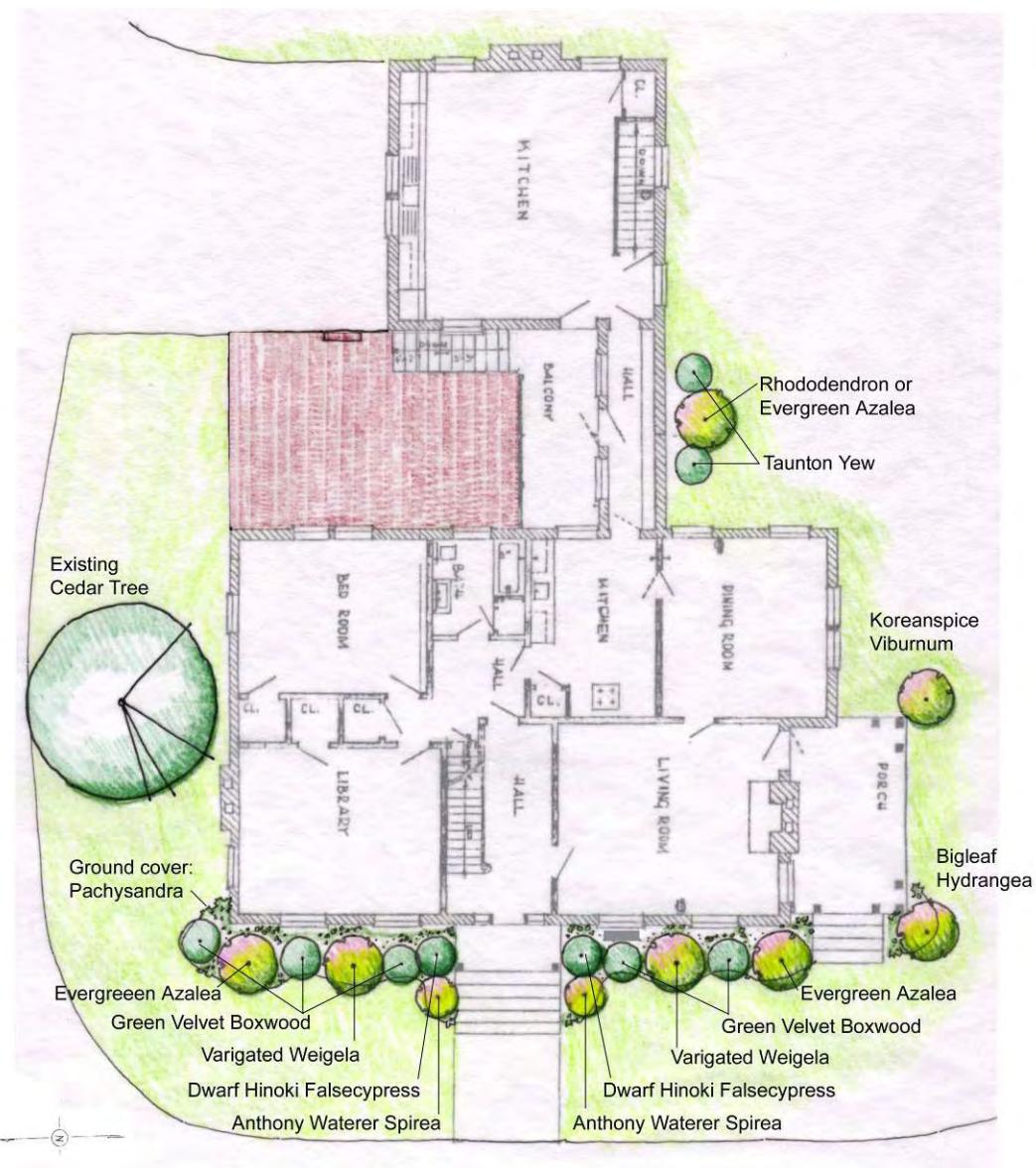


Figure 34. Proposed planting plan for Childers House.



Figure 35. Elevation illustrating proposed planting plan for Childers House.

## BRICK

The Childers House is constructed out of brick and mortar. The primary method of destruction for brick and mortar is water, plant roots, and lichen growth. All three of these are present on all facades of the Childers House.

### BRICK WALLS

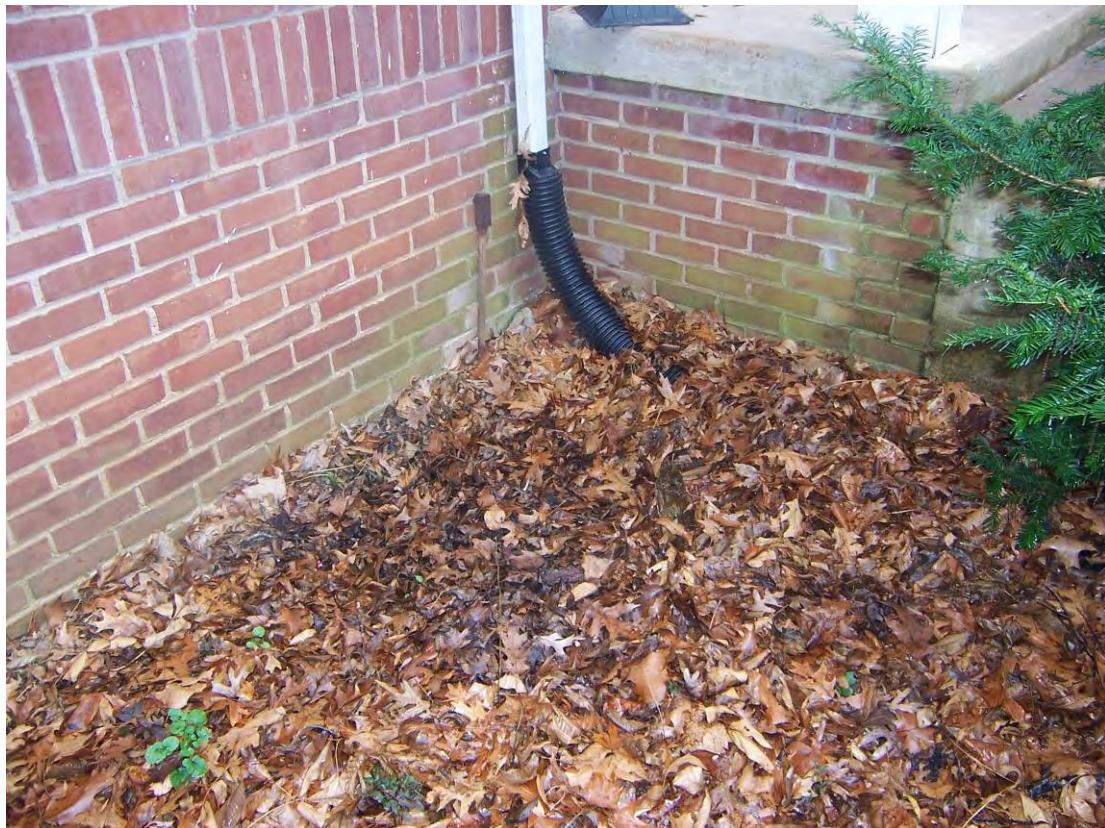


Figure 36. Fallen leaves and front stoop gutter overflow area lead to lichen growth on brick walls (and brick failure in basement) to the left of front stoop.



Figure 37. Shade from overgrown cedar tree and fallen leaves lead to lichen growth on north facade.



Figure 38. Closeup of lichen growth on north facade near chimney.



Figure 39. Leaky gutter with wet bricks and mortar on south facade of kitchen addition.



Figure 40. Water damaged painted bricks in the basement near central stair.

**BRICK—CHIMNEYS**

Figure 41. Soot staining, inappropriately repaired brick, and historically inappropriate chimney cap on north chimney.



Figure 42. Soot staining and inappropriate chimney cap on south chimney.



Figure 43. Closeup of soot staining and inappropriate chimney cap on south chimney.



Figure 44. Soot staining, deteriorated mortar, and inappropriate brick reconstruction on kitchen addition chimney.



Figure 45. Soot staining, deteriorated mortar, and inappropriate brick reconstruction on kitchen addition chimney.



Figure 46. Lichen growth on kitchen addition chimney.



Figure 47. Lichen growth on kitchen addition chimney.

#### BRICK—WINDOWSILLS AND LINTELS



Figure 48. Paint staining below kitchen addition window.



Figure 49. Efflorescence below dining room window.

#### BRICK—PATIO



Figure 50. Overall view of brick patio between main house and kitchen addition.



Figure 51. Downspout and spigot that empty onto patio promoting lichen growth and damage to mortar, also inappropriate mortar patch.



Figure 52. Missing bricks and fallen leaves on brick step to patio.



Figure 53. Overall lichen growth on patio.



Figure 54. Closeup of lichen growth on patio.

## TREATMENT RATING 1: PRESERVE

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED WITH COMPATIBLE MATERIAL AND DESIGN.

### **Statement of Importance:**

All of the brick and mortar contributes to the historic appearance of the Childers House and dates either to the period of historic significance or represents later, sensitive repair or replacement work.

### **Condition:**    *Fair – Preserve*

Fair to good - Preserve

Poor - Replace

## INVENTORY QUANTITY AND CONDITION

The brick and mortar is evaluated as Fair when:

- the brick and mortar is structurally and architecturally intact, and
- poor patch work over parts of the brick and mortar will need to be replaced, and
- maintenance of the brick and mortar is needed for it to continue to function as it was designed, and
- damaged surfaces should be cleaned and repaired as per preservation standards laid out in this manual.

Minor deficiency of the brick patio may exist where:

- Repairs are needed as necessary with materials that are like in appearance and mechanical properties, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years, and/or
- poor repair job which should be cleaned and properly executed.

## MAINTENANCE / MANAGEMENT GUIDELINES FOR MASONRY

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when necessary.

The following recommendations for care of historic concrete are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

Following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

## ***IDENTIFY, RETAIN, AND PRESERVE***

### ***Recommended***

- Identifying, retaining, and preserving masonry features that are important in defining the overall historic character of the building such as walls, brackets, railings, cornices, window architraves, door pediments, steps, and columns; and details such as tooling and bonding patterns, coatings, and color.

### ***Not Recommended***

- Removing or radically changing masonry features that are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Replacing or rebuilding a major portion of exterior masonry walls that could be repaired so that, as a result, the building is no longer historic and is essentially new construction.
- Applying paint or other coatings such as stucco to masonry that has been historically unpainted or uncoated to create a new appearance.
- Removing paint from historically painted masonry.
- Radically changing the type of paint or coating or its color.

## ***PROTECT AND MAINTAIN***

### ***Recommended***

- Protecting and maintaining masonry by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved decorative features.
- Cleaning masonry only when necessary to halt deterioration or remove heavy soiling.
- Carrying out masonry surface cleaning tests after it has been determined that such cleaning is appropriate. Tests should be observed over a sufficient period so that both the immediate and the long range effects are known to enable selection of the gentlest method possible.
- Cleaning masonry surfaces with the gentlest method possible, such as low pressure water and detergents, using natural bristle brushes.
- Inspecting painted masonry surfaces to determine whether repainting is necessary.
- Removing damaged or deteriorated paint only to the next sound layer using the gentlest method possible (e.g., hand scraping) prior to repainting.
- Applying compatible paint coating systems following proper surface preparation.
- Repainting with colors that are historically appropriate to the building and district.
- Evaluating the overall condition of the masonry to determine whether more than protection and maintenance are required, that is, if repairs to the masonry features will be necessary.

### ***Not Recommended***

- Failing to evaluate and treat the various causes of mortar joint deterioration such as leaking roofs or gutters, differential settlement of the building, capillary action, or extreme weather exposure.
- Cleaning masonry surfaces when they are not heavily soiled to create a new appearance, thus needlessly introducing chemicals or moisture into historic materials.
- Cleaning masonry surfaces without testing or without sufficient time for the testing results to be of value.

- Sandblasting brick or stone surfaces using dry or wet grit or other abrasives. These methods of cleaning permanently erode the surface of the material and accelerate deterioration.
- Using a cleaning method that involves water or liquid chemical solutions when there is any possibility of freezing temperatures.
- Cleaning with chemical products that will damage masonry, such as using acid on limestone or marble, or leaving chemicals on masonry surfaces.
- Applying high pressure water cleaning methods that will damage historic masonry and the mortar joints.
- Removing paint that is firmly adhering to, and thus protecting, masonry surfaces.
- Using methods of removing paint that are destructive to masonry, such as sandblasting, application of caustic solutions, or high pressure water blasting.
- Failing to follow manufacturers' product and application instructions when repainting masonry.
- Using new paint colors that are inappropriate to the historic building and district.
- Failing to undertake adequate measures to assure the protection of masonry features.

## ***REPAIR***

### ***Recommended***

- Repairing masonry walls and other masonry features by repointing the mortar joints where there is evidence of deterioration such as disintegrating mortar, cracks in mortar joints, loose bricks, damp walls, or damaged plasterwork.
- Removing deteriorated mortar by carefully hand raking the joints to avoid damaging the masonry.
- Duplicating old mortar in strength, composition, color, and texture.
- Duplicating old mortar joints in width and in joint profile.
- Repairing masonry features by patching, piecing-in, or consolidating the masonry using recognized preservation methods. Repair may also include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of masonry features when there are surviving prototypes such as terra cotta brackets or stone balusters.
- Applying new or non-historic surface treatments such as water-repellent coatings to masonry only after repointing and only if masonry repairs have failed to arrest water penetration problems.

### ***Not Recommended***

- Removing non-deteriorated mortar from sound joints, and then repointing the entire building to achieve a uniform appearance.
- Using electric saws and hammers rather than hand tools to remove deteriorated mortar from joints prior to repointing.
- Repointing with mortar of high Portland cement content (unless it is the content of the historic mortar). This can often create a bond that is stronger than the historic material and can cause damage as a result of the differing coefficient of expansion and the differing porosity of the material and the mortar.
- Repointing with a synthetic caulking compound.
- Using a "scrub" coating technique to repoint instead of traditional repointing methods.
- Changing the width or joint profile when repointing.

- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the masonry feature or that is physically or chemically incompatible.
- Applying waterproof, water repellent, or non-historic coatings such as stucco to masonry as a substitute for repointing and masonry repairs. Coatings are frequently unnecessary, expensive, and may change the appearance of historic masonry as well as accelerate its deterioration.

### ***REPLACE***

#### *Recommended*

- Replacing in-kind an entire masonry feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include large sections of a wall, a cornice, balustrade, column, or stairway. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

#### *Not Recommended*

- Removing a masonry feature that is unrepairable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

## BRICK: PROBLEMS AND DETERIORATION<sup>1</sup>

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**04211-08**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

Problems may be classified into two broad categories: 1) Natural or inherent problems based on the characteristics of the material and the conditions of the exposure, and 2) Vandalism and human induced problems.

Although there is some overlap between the two categories, the inherent material deterioration problems generally occur gradually over long periods, at predictable rates and require appropriate routine or preventive maintenance to control. Conversely, many human induced problems, (especially vandalism), are random in occurrence; can produce catastrophic results; are difficult to prevent, and require emergency action to mitigate. Some human induced problems, however, are predictable and occur routinely.

### NATURAL AND INHERENT PROBLEMS

1. Cracking: May be caused by structural movement or settlement of the building, use of too hard of a repointing mortar, or differing rates of expansion and contraction between adjacent materials.
2. Crazing: A pattern of tiny cracks; typical on glazed brick due to the different coefficients of expansion and contraction between the brick and the glaze. This is not usually a serious problem unless the cracks extend into the body of the brick allowing moisture to infiltrate the masonry.
3. Efflorescence: Deposits of soluble salts on the surface of the masonry evident as a white haze. Moisture traveling through the capillaries of masonry may draw excess amounts of soluble salts along with it. As the moisture is drawn to the surface, it evaporates leaving the salt deposits behind. Efflorescence may be an indication that salts are present under the masonry surface called subflorescence, which is a more serious condition.
4. Erosion: The gradual wearing away of stone or masonry caused by combined forces of wind and rain against the surface of the material.
5. Flaking: An early form of peeling or spalling where thin, flat outer layers of the masonry become detached; usually caused by the presence of moisture combined with freeze/thaw cycles. Water-repellent coatings may also cause the surface to flake.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

6. Peeling: May result from use of an inferior masonry unit or from weathering (as in flaking above).
7. Rising Damp: The movement of groundwater along with salts up through the base of masonry walls by suction or capillary action; evident as a horizontal wet stain on the interior and/or exterior of the building. The presence of salts can produce efflorescence on the surface in addition to facilitating other forms of moisture-related deterioration. Rising damp is caused by improper drainage causing ground to become saturated, or a high watertable.
8. Spalling: When the outer layers of the masonry begin to peel or break off unevenly; it is usually caused by the build-up of moisture and salts trapped in the masonry combined with the pressures from freeze\thaw cycles. Spalling may also result from using too hard of a repointing mortar and improper or abrasive cleaning.
9. Subflorescence: A build-up of salt deposits beneath the masonry surface as moisture in the wall evaporates. During freeze/thaw cycles, the moisture and salts expand and build up pressure inside the masonry. This internal pressure can lead to spalling.
10. Weathering: The natural wearing away of stone or masonry due to the combined forces of wind and rain; more commonly found at corners and projecting details.

#### HUMAN-INDUCED PROBLEMS

1. Chipping: May be caused by improper repair work such as using mortar that is too hard; may be caused by accidental damage or vandalism.
2. Bricks under fired: Inferior bricks may crumble easily when exposed to the natural weathering processes.
3. Prolonged saturation with water caused by leaks in pipes and gutters, open joints or ground moisture: The prolonged presence of water in conjunction with natural freeze/thaw cycles can lead to spalling, efflorescence and loosened mortar joints.
4. Inappropriate mortar used for repointing: Mortar for use in repointing older brick should typically contain lime rather than Portland cement. Lime-based mortar is more flexible and can better accommodate the thermal stresses of expansion and contraction that the masonry units undergo, while Portland cement mortar is dense and more impermeable. A mortar that is too hard can put the units under excessive stress. When the units expand, the dense Portland cement does not compact and can force the brick units to spall. When the units contract, the Portland cement mortar may cause cracking between the mortar and the units, allowing water to access the masonry, which can eventually lead to spalling of the brick units.
5. Portland cement mixture used for repointing may contain sulfate impurities and contaminate adjacent brick with salts, which can cause the brick to crumble or exfoliate.
6. Application of paint or water-repellent coating to masonry surface: These coatings can prevent the transmission of water vapor through the masonry wall which can lead to a build-up of moisture in the units themselves. Excessive water retention can cause efflorescence and spalling.

7. Sandblasted brick: Sandblasting removes the hard, outer surface of the brick, exposing the softer, more porous core to the weather, which can increase the rate of deterioration.

END OF SECTION

# REMOVING BIOLOGICAL GROWTH FROM EXTERIOR MASONRY AND STUCCO<sup>1</sup>

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04200-02

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on removing biological growth such as lichens, algae, mold, and mildew from masonry and stucco.
- B. Biological growths such as lichens, algae, moss, and fungi growing on masonry walls are usually an indication that there is excess moisture in or around the masonry. These growths should be removed, as they attract moisture to the masonry surface and hold it there, which can lead to more serious problems. Lichens and mosses in particular, produce oxalic acid which can damage certain types of historic masonry.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the CRM.

## PART 2---PRODUCTS

### 2.01 MANUFACTURERS

- A. ProSoCo, Inc.  
P.O. Box 1578  
Kansas City, KS 66117  
913/281-2700

### 2.02 MATERIALS

- A. For Removing Mold and Mildew:

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

1. Non-sudsing ammonia or one of the following bleaches:

CAUTION: DO NOT MIX AMMONIA WITH CHLORINE BLEACHES, A POISONOUS GAS WILL RESULT! DO NOT USE BLEACH ON BIRD DROPPINGS.

Sodium Hypochlorite (NaOCl):

- a. An unstable salt produced usually in aqueous solution and used as a bleaching and disinfecting agent.
- b. Other chemical or common names include Bleaching solution\*; Household bleach\*; Laundry bleach\*; Solution of chlorinated soda\*.
- c. Potential Hazards: CORROSIVE TO FLESH.
- d. Available from chemical supply house, grocery store or supermarket, hardware store or janitorial supply distributor.

-OR-

Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>):

- a. An unstable compound used especially as an oxidizing and bleaching agent, an antiseptic, and a propellant.
- b. Other chemical or common names include Peroxide of hydrogen\*; Solution of hydrogen dioxide\*; Superoxol\*; (hydrogen peroxide is commonly sold as a 3% solution; Superoxol is a 30% solution; Superoxol causes flesh burns; 3% hydrogen peroxide does not).
- c. Potential Hazards: TOXIC (when concentrated); CORROSIVE TO FLESH; FLAMMABLE (in high concentration).
- d. Available from chemical supply house, drugstore, pharmaceutical supply distributor, or hardware store.

-OR-

Calcium Hypochlorite (CaCl<sub>2</sub>O<sub>2</sub>):

- a. A white powder used especially as a bleaching agent and disinfectant.
- b. Other chemical or common names include Chlorinated calcium oxide; Bleaching powder\*; Calcium oxymuriate\*; Chloride of lime\*; Chlorinated lime\*; Hypochlorite of lime\*; Oxymuriate of lime\*.
- c. Potential Hazards: CORROSIVE TO FLESH; FLAMMABLE (WHEN IN CONTACT WITH ORGANIC SOLVENTS).
- d. Available from chemical supply house, dry cleaning supply distributor, drugstore or pharmaceutical supply distributor, janitorial supply distributor, swimming pool supply distributor, or water and sanitation supply distributor.

-OR-

Chloramine-T: Chloramine is any of various compounds containing nitrogen and chlorine.

2. Trisodium Phosphate:

NOTE: THIS CHEMICAL IS BANNED IN SOME STATES SUCH AS CALIFORNIA. REGULATORY INFORMATION AS WELL AS ALTERNATIVE OR EQUIVALENT CHEMICALS MAY BE REQUESTED FROM THE ENVIRONMENTAL PROTECTION AGENCY (EPA) REGIONAL OFFICE AND/OR THE STATE OFFICE OF ENVIRONMENTAL QUALITY.

- a. Strong base-type powdered cleaning material sold under brand names.

- b. Other chemical or common names include Sodium Orthophosphate; Tribasic sodium phosphate; Trisodium orthophosphate; TSP\*; Phosphate of soda\*; (also sold under brand names).
  - c. Potential Hazards: CORROSIVE TO FLESH.
  - d. Available from chemical supply house, grocery store or supermarket or hardware store.
3. Powdered detergent such as "Tide" or approved equal.
- B. Proprietary cleaner such as "Limestone Restorer" (ProSoCo, Inc.), or approved equal.
  - C. Clean, potable water

## 2.03 EQUIPMENT

- A. Garden hose and nozzle
- B. Rubber or polyethylene bucket (DO NOT USE A METAL BUCKET AS IT MAY REACT WITH THE CHEMICAL CLEANER AND PRODUCE TOXIC FUMES)
- C. Glass or ceramic mixing bowl
- D. Knife blade
- E. Stiff, natural bristle brushes (non-metallic)
- F. Tampico brush, roller or low pressure (50 psi maximum) spray such as pneumatic garden sprayer
- G. Rubber gloves
- H. Safety glasses

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Determine the source of excessive moisture, i.e. leaky downspout, standing water, roof overhang, vegetation, etc., and make any necessary repairs before continuing with this task.
- B. Determine the type of stain, i.e. algae and lichens, or mold and mildew.

### 3.02 PREPARATION

- A. Protection:
  1. Provide adequate wash solutions (i.e. water, soap, and towels) before starting the job.
  2. Do not spray in the immediate vicinity of unprotected people and animals.

### 3.03 ERECTION, INSTALLATION, APPLICATION

NOTE: DO NOT TRY MORE THAN ONE TREATMENT ON A GIVEN AREA UNLESS THE CHEMICALS USED FROM PRIOR TREATMENT HAVE BEEN WASHED AWAY.

- A. Removing Lichens and Algae (ONLY):
  1. Remove as much plant growth as possible using a knife blade and stiff bristle brush.
  2. Water rinse the surface to remove most of the plant material.
    - a. If the substrate is sound and dense, use low to medium water pressure (100-400 psi).
    - b. If the masonry is softer, use standard water pressure from the spigot.
  3. Allow water to soak plant growth for approximately 30 minutes.

4. Gently scrub the surface with a stiff, natural bristle brush.
5. Thoroughly rinse the surface again with clean, clear water at low pressure from a garden hose.

NOTE: DO NOT USE ANY CHEMICALS WITHOUT FIRST CONSULTING WITH CRM.

B. Removing Mold and Mildew (ONLY):

CAUTION: DO NOT MIX AMMONIA WITH CHLORINE BLEACHES, A POISONOUS GAS WILL RESULT!

1. Mix the following:

3 oz. (2/3 cup) trisodium phosphate (TSP) cleaner  
1 oz. (1/3 cup) powdered detergent (i.e. Tide)  
1 qt. 5% sodium hypochlorite bleach (laundry bleach)  
3 qts. warm water

-OR-

1 part ammonia with 3 parts water

2. Apply the solution to the affected area and scrub with a medium-hard natural bristle brush. Keep the surface saturated until the stain is bleached,

CAUTION: BE SURE TO WEAR RUBBER GLOVES AND SAFETY GLASSES WHEN APPLYING THE SOLUTION.

3. Thoroughly rinse the surface with clean, clear water from a garden hose and allow to dry.
4. Repeat the process as necessary to achieve the desired level of cleanliness.

-OR-

C. For treating any of the above (lichens, algae, mold or mildew), try using a proprietary cleaner such as Limestone Restorer (ProSoCo, Inc.), or approved equal.

1. Add 1 part Limestone Restorer to 3 parts water and mix in a rubber or polyethylene bucket.
2. Apply a flood coat of this mixture to the masonry using a low pressure spray (approximately 50 psi).

CAUTION: DO NOT USE A HIGH PRESSURE SPRAY WHEN APPLYING THIS SOLUTION AS THIS MAY CAUSE THE SOLUTION TO BE DRIVEN DEEPER INTO THE PORES OF THE MASONRY, MAKING REMOVAL OF THE SOLUTION DIFFICULT.

- a. Begin spraying at the top of the vertical surface and move across horizontally. Allow 100mm rundown.
- b. Continue the next horizontal pass across the previous run down.
- c. Allow the solution to remain on the surface approximately 5-30 minutes depending upon the thickness of the growth.
- d. Gently scrub the surface with a stiff, natural bristle brush. Thoroughly rinse the treated area using pressure-applied water (approximately 400 to 1500 psi) with a 40-60 degree fan spray or garden hose with nozzle adjusted to a tight stream. Rinse from the bottom of the treated area to the top.
- e. Allow the surface to dry a minimum of 24 hours.

# REPOINTING MASONRY USING LIME MORTAR<sup>1</sup>

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04520-02

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on repointing stone masonry using lime mortar.
- B. Repointing is the process of removing deteriorated mortar from a masonry joint and replacing old mortar with new, sound mortar.
- C. This process is sometimes referred to as "tuck pointing", though "tuck pointing", is actually a decorative treatment rather than a method of repair. True tuck pointing is the process of adding a finish layer of mortar, occasionally tinted, to the outer portion of a newly laid joint.
- D. Major reasons for mortar joint failures include:
  - 1. Weathering action,
  - 2. Settling,
  - 3. Temperature cycles,
  - 4. Poor original design and materials, and
  - 5. Lack of exterior maintenance.
- E. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)
- F. For guidance on preparing lime mortar, see 04100-03-S.

### 1.02 SUBMITTALS

- A. Manufacturers' literature describing packaged items.
- B. Source and screen analysis of bulk aggregate.
- C. Mortar sample: Submit, for verification and approval, a sample of each type of mortar used, in form of 6" long by 1/2" wide sample strips of mortar set in aluminum or plastic channels.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

1. Provide record of mortar mix, composition, and field procedures to be followed.

### 1.03 QUALITY ASSURANCE

- A. Mock-ups: Raking and Repointing Sample Work:
  1. Test/Sample Area and THE CULTURAL RESOURCES POC Approval:
    - a. Initially perform sample joint raking and repointing on each of a 100 sq. ft. test of stone, brick, and terra cotta areas as approved by THE CULTURAL RESOURCES POC.
    - b. Demonstrate proficiency with joint raking tools and ability to not damage masonry units with either hand or power tools.
    - c. Mix and cure test batch of repointing mortar and place in joints; repeat test mix until mortar color is approved. Test mortar should be matched, dried, and approved before placing in joints.
    - d. Demonstrate workmanship of repointing procedures and joint finishing.
    - e. Gain written approval from THE CULTURAL RESOURCES POC for test area before proceeding with remaining work.
  2. Joint Raking Method: Rake joints by hand ONLY using special joint cleaning chisels and hammer.
  3. Repointing Method: Repoint joints by hand ONLY using approved pointing trowels. NO "BAGGING" OR CAULKING GUN POINTING METHODS APPROVED.

### 1.04 PROJECT/SITE CONDITIONS

- A. Environmental Conditions: Perform repointing only when the temperature is between 40° Fahrenheit and 80° Fahrenheit. If the temperature is below 40° the mortar sets too slowly, and there is a good chance of freezing before it fully sets. If the temperature is above 80°, the mortar will set too quickly, and there is a strong chance of excessive loss of water prior to adequate setting.

## PART 2---PRODUCTS

### 2.01 MANUFACTURERS

- A. Repointing Tools: Available from good hardware stores, building material suppliers or mail-order catalogues.
  1. The Stanley Gold-blatt Tool Co.  
511 Osage Ave.  
Kansas City, KS 66105-2198  
913/621-3010
  2. Marshalltown Trowel Co.  
P.O. Box 738  
Marshalltown, IA 50158  
515/753-5999
  3. Masonry Specialty Co.  
4430 Gibsonia Rd.  
Gibsonia, PA 15044  
412/443-7080

### 2.02 MATERIALS

- A. Lime mortar (See 04100-03-S for materials and procedures in preparing lime mortar)
- B. Clean, potable water

### 2.03 EQUIPMENT

- A. Trowels: range in length from 10-12 inches

- B. Chisels:
  - 1. Joint chisels or a standard mason's chisel with a 1-1/2" blade and a long narrow handle
  - 2. Floor chisels
- C. Hammers:
  - 1. 5# stone dressing hammer
  - 2. 2# striking hammer
  - 3. "No-Bounce" hammer
  - 4. Full size and one half size brick hammers
- D. Joint Tools: (see 2.01 MANUFACTURERS above)
  - 1. 3/8"-1/4" raised beaded tool
  - 2. 3/8"-1/4" beaded striking tool
  - 3. 1/2" raised beaded tool with offset handle
  - 4. 1/2" flat joint iron
  - 5. Pointing tool should be about 1/16" narrower than the joint being filled to achieve good compaction
- E. Hawks: Plywood or steel hawk (mortar board)
- F. Brushes:
  - 1. Natural bristle brushes
  - 2. Stiff bristle brushes (no wire)
- G. Spray bottle

### 2.03 MIXES

- A. See 04100-03-S for lime mortar mixes

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Examine all existing exterior mortar joints. If the answer to any of the following questions is yes, then the building's joints are deteriorated and need repointing:
  - 1. Are mortar joints eroded back more than 1/4" from the masonry face?
  - 2. Are there cracks running vertically or horizontally through the mortar?
  - 3. Are mortar bonds broken or pulled away from the masonry?
  - 4. Has mortar fallen out of joints?
  - 5. Is mortar excessively soft, powdery, or crumbling?
  - 6. Is pointing badly-stained?
- B. Typical exterior damage due to mortar deterioration includes open joints, efflorescence, spalling and loosened masonry units.
- C. Typical interior damage due to mortar deterioration includes failing plaster and stained wall paper.
- D. A professional pointer experienced in old masonry is required for any of the following areas or conditions:
  - 1. Chimneys need repointing
  - 2. Window lintels must be rebuilt
  - 3. Masonry is loose or missing
  - 4. Work must be done from scaffolds or extension ladders
  - 5. The original mortar joints were "beaded"-tooled with a raised, round-profiled joint that projects out from the wall

### 3.02 PREPARATION

- A. Preparing the Joints:
  1. Clean area of loose dirt and debris using a stiff bristle brush and remove all extraneous fastenings and devices.
  2. Install necessary protection of adjacent building materials, property, and persons from joint cleaning work and dirt.
  3. Control dust and dirt from raking work; dampen area being worked; and use curtains to limit spread of dust from joint raking and cutting operations.

- B. Joint Cutting and Raking:

- 1. Cut and rake old mortar from existing joints by hand using a hammer and chisel.

NOTE: POWER CHISELS AND POWER SAWS SHOULD NOT BE USED.

- 2. Place the chisel in the center of the joint and pound it with a striking hammer or "No-Bounce" hammer until the mortar disintegrates.
  3. Rake out the loose material to a depth of about 1 inch and never to a depth less than their width. Leave a clean, square face at the back of the joint to provide optimum contact with the new mortar.

CAUTION: AVOID OVER CUTTING ENDS OF VERTICAL JOINTS, WIDENING JOINTS OR CUTTING INTO BEDDING FACES OF MASONRY UNITS.

- 4. While raking out joints, remove all metal fittings such as nails, brackets, and clips on both horizontal and vertical surfaces.
  5. Carefully clean out the prepared face with a soft or stiff bristle brush, or blow the joints clean with low-pressure compressed air (40-60 psi).
  6. Thoroughly flush out joint with clean, clear water.

### 3.03 ERECTION, INSTALLATION, APPLICATION

- A. Filling Joints:

- 1. Dampen masonry surfaces and joints to control suction and evaporation before placing repointing mortars.

NOTE: There should be no free water present which may cause voids in the mortar.

- 2. Using a pointing tool, push the mortar into the joint from a board and iron with the maximum possible pressure; The mortar should be applied in layers, each to a maximum thickness of 3/8".

NOTE: The pointing tool should be about 1/16" narrower than the joint being filled to achieve good compaction. In some cases, the joints will be so thin that a standard pointing tool will need to be ground down to fit the joint.

- 3. Thoroughly compact each layer of mortar and allow to set until thumb-print hard before applying the next layer of mortar.
  4. Fill the joints so that they are slightly recessed from the masonry face. Avoid leaving a joint which is visually wider than the actual historical appearance.
  5. Continuously keep all excess and spilled mortar brushed off the faces of masonry units, ledges and other surfaces before it sets or stains the work.

- B. Joint Finishing:

- 1. Begin when mortar attains "thumb print" hardness.
  2. Tool the joint to match the old mortar.

NOTE: It is important to tool the joint at the right stage; if the joint is too soft, the color will be lighter than expected and hairline shrinkage cracks are likely to occur; if the joint is too hard when tooled, dark streaks may appear (tool burning) and good closure of the mortar against the masonry will not be achieved. Excessive tooling may bring lime and fine aggregates to the surface, creating a visual change in texture and a surface subject to early deterioration.

3. To produce a roughened texture, lightly spray the mortar with water after the initial set, stipple the mortar with a stiff bristle brush, or dab the mortar with coarse sacking.
4. Protect finished work from direct sun and rain until the face has dried and hardened.

### 3.04 ADJUSTING/CLEANING

#### A. Cleaning Up:

1. Use masking and drop cloths to prevent mortar stains on adjacent work and ledges.
2. Keep work areas clean and free from mortar drips, spills, and residue of waste mortars or wash-off.
3. Clean off excess mortar as work proceeds using masonry brushes before mortar sets.
4. Wash completed repointing work when finished mortar joints are set with clean water and masonry brushes, scrubbing only as required to clean mortar stains off masonry without scouring the units and joint faces.
5. Do not use acid or detergent cleaning agent to aid mortar removal and clean-up without written approval from THE CULTURAL RESOURCES POC.

#### B. Curing:

1. Schedule work only when moderate weather is forecast.
2. Protect completed work from adverse weather, heavy rainfall, freezing, and drying by direct sunlight and winds until cured.
3. Sprinkle or mist repointed work as required to achieve cure in mortar joints for a minimum of 72 hours after completion.
4. Lime Mortar: Cures by drying and crystallization, not by hydration; and can be washed out of joints if not protected before it cures.

#### C. Final Cleaning:

1. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water spray applied at low pressure.

NOTE: Use of metal scrapers or brushes is not permitted. Use of acid or alkali cleansing agents is not permitted.

- D. Some efflorescence, called new construction "bloom," occasionally appears on the surface within the first few months following a repointing project. These deposits normally are harmless and are removed by the natural washing of the rain. If not removed by natural weathering, they can be removed with dry brushing with a bristle brush. The use of chemical cleaners to remove this type of efflorescence normally is not necessary; AVOID USING ACIDS, PARTICULARLY MURIATIC ACID.

END OF SECTION

# PREPARING LIME MORTARS FOR REPOINTING MASONRY<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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04100-03

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This standard includes guidance on preparing lime mortars for repointing masonry.
- B. Lime mortars are preferable to Portland cement mortars for repointing historic masonry:
  1. Lime mortars are more permeable by water. Water passing through lime mortar will dissolve a small portion of the lime and then will deposit it in hairline cracks as the water evaporates.
  2. Lime mortars expand slightly during setting, and resists shrinkage which causes cracking.
  3. Lime mortars are more durable than generally recognized.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage, and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Conshohocken, PA 19428, (610) 832-9585 or FAX (610) 832-9555.

### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Lime and cement must be protected from rainwater and ground moisture, as water vapor in the air can begin the setting process. Other materials also should be protected from contamination.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## PART 2---PRODUCTS

### 2.01 MATERIALS

NOTE: The use of standard specifications for materials, such as those developed by the ASTM, provides an easily referenced level of quality.

- A. Lime: Should conform to ASTM C207, Type S, high plasticity, Hydrated Lime for Masonry Purposes.
  - 1. Lime which meets this standard will "work" well, resists drying during curing, and is sufficiently strong for the purpose of repointing.
  - 2. Lime expands as it hydrates, making high lime mortars more resistant to crack formation.
- B. Cement: Should conform to ASTM C150, Type I, White. It should not have more than 0.60% alkali or more than 0.15% water soluble alkali. Use gray Portland cement ONLY if a dark mortar is to be matched.
  - 1. Cement meeting this standard should increase the workability of the mortar, accelerate the setting time, and slightly increase the strength of the mortar.
  - 2. The low alkali content will prevent efflorescence.
- C. Sand: Free of impurities and conforming to ASTM C144.
  - 1. Sand color, size, and texture should match the original as closely as possible. Provide a sample of the sand for comparison to the original, and have it approved by THE CULTURAL RESOURCES POC before beginning repointing work.
  - 2. When possible, use bar sand or beach sand rather than crushed sand for the repointing mortar.
    - a. Crushed sand has sharp edges, which makes it more "sticky" and difficult to work into the joints.
    - b. Bar sand, on the other hand, has rounded edges and flows easily during the mortar application.
    - c. The working characteristics of mortar made with crushed sand may be improved by adding a slight amount of Portland cement. The amount of cement should be determined by experimentation, but should not exceed 20% of the total lime/cement binder. **20% OR LESS OF CEMENT HAS MINIMAL EFFECT ON THE HARDNESS OF THE MORTAR. CEMENT CONTENT ABOVE 20% WILL MAKE THE MORTAR TOO HARD.**

NOTE: Bar sand or beach sand should be washed to remove the salts before using.

- D. Clean, potable water: If the water must be transported or stored in a container, the container must not impart any chemicals to the water.
- E. Stone dust finely ground from the same stone as that to be repointed.
- F. Additives: NO antifreeze compounds or other admixture shall be used.

NOTE: Do not use anti-freeze compounds. These compounds are designed for use with cement mortars, and their effectiveness with high lime mortars is questionable. Furthermore, the compounds contain salts which can lead to serious problems in the masonry at a later time.

NOTE: Air entraining agents are not recommended. These agents are designed for use with cement rather than lime, and they result in decreased bonding of the mortar and the masonry. Air entraining is not necessary with high lime mortars because of the natural ability of these mortars to flex with temperature changes.

## 2.02 EQUIPMENT

- A. Surface temperature thermometer - can be either mechanical (less expensive but must be calibrated often) or digital electronic
- B. Wooden mortar boxes
- C. Hoe
- D. Mesh screen
- E. Hawks: Plywood or steel hawk (mortar board)

## 2.03 MIXES

- A. Some factors to consider when mixing lime mortar include durability, color and texture, and workability.

- 1. Durability: Repointing mortar should be softer than the masonry units and the original mortar to reduce stresses at the edge of the masonry and, in the case of lime mortar, to reduce shrinkage which can cause cracks in the mortar.
    - a. If the new mortar is harder than the masonry or the original mortar, it can cause serious stresses within the wall during thermal expansion and contraction, which can lead to deterioration of the masonry units rather than the mortar.
    - b. If the mortar is softer, any deterioration which occurs will take place in the mortar, which is easier to replace than the units themselves.
  - 2. The repointing mortar should allow the passage of water, both liquid and vapor. If the mortar does not allow water to pass freely through it, the water can become trapped inside the wall, freeze, and cause serious deterioration to the masonry.
  - 3. Color and texture: The repointing mortar should match the original mortar in color, texture, and physical characteristics.
    - a. Obtaining an accurate color match is best achieved by selecting an appropriate sand.
      - 1. Use sand which is similar to the original in color and gradation. Sand from more than one source may be required.
      - 2. For repointing of natural stones, use finely ground stone "dust" in the mortar to match the joints as closely as possible to the stone.
    - b. If the original mortar was tinted, or if it is impossible to obtain a color match through the use of sand, it may be necessary to use a special mortar pigment.

CAUTION: PIGMENTS MAY REACT WITH OTHER INGREDIENTS IN THE MORTAR TO FORM EFFLORESCENCE. THEY MAY ALSO WEATHER AT A DIFFERENT RATE THAN NATURAL COLORING AND CAUSE A COLOR VARIATION IN THE MORTAR.

NOTE: If pigments must be used, pure mineral oxides should be used because they do not fade or leach out of the mortar. Amount of pigment should not exceed 2% of the mortar mix by the weight.

- c. Many mortars used before the twentieth century have small lumps of incompletely burned or ground lime, or other impuri-

ties. To match the original appearance of the masonry, these impurities must be included in the new repointing mortar. Use identical materials, such as ground oyster shells (obtained at feed stores) or lumps of lime, to duplicate original lumps.

4. Workability: The workability or plasticity of the mortar is a direct result of the selection of materials.

B. Mortar Mix:

1. Have the existing mortar completely analyzed to insure that the repointing mortar will not be less permeable/harder than the masonry units or the original mortar. IT IS BETTER TO HAVE MORTAR THAT IS MORE PERMEABLE THAN LESS.
2. Measure all ingredients by cubic volume using a pre-established uniform measure, such as a small bucket, rather than a less uniform measure such as a shovel.
3. For historic masonry set in lime mortar, use the following mortar mix:

1 part Portland cement  
3 parts lime  
8-12 parts sand (To match existing mortar as closely as possible.)

NOTE: The exact mix required will relate to the grain size and sharpness of the sand and will vary depending on the supply.

-OR-

For historic masonry set in standard mortar, use the following mortar mix (ASTM C270 Type "0") as a starting point:

1 part Portland cement  
2 parts lime or lime putty  
6 to 9 parts sand and stone dust (To match existing mortar as closely as possible.)

-OR-

For Limestone (ASTM C270 Type "N"):

1 part Portland cement  
1 parts lime  
4-6 parts aggregate  
Enough water to form a workable consistency

-OR-

For Granite (ASTM C270 Type "S"):

2 parts Portland cement  
1 part lime  
7-9 parts aggregate  
Enough water to form a workable consistency

NOTE: For deteriorated granite walls or granite walls indicating movement, use ASTM C270 type "N" as listed above for limestone.

4. Mix a final "job-size" batch once the correct sand color, cement content, etc. have been determined through small tests to ensure the on-site mixing conditions will result in the same final product.

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

#### A. Mix Hydrated Lime:

1. Add dry bagged hydrated lime to water. Stir and hoe the mass to form a thick cream.
2. Allow to stand at least 24 hours before use.

#### B. Prepare Roughage Premix (for later use):

1. Accurately proportion the sand and lime using measuring boxes constructed to contain the exact volume of each ingredient required to make one batch.
2. Mix sand and lime thoroughly for about ten minutes. Store in plastic-lined drums and seal until required.

NOTE: This compound may be stored indefinitely if kept sealed from air and kept from freezing.

3. When required for use, add and mix the correct portion of gauging cement as specified and use immediately. ACCURATE PORTIONING IS VERY IMPORTANT.

#### C. Add cements to lime and aggregate mixes immediately before the use of the mortar.

1. Perform all batching with wooden boxes or plastic pails of known volume to ensure standardization and conformity of measurement; SHOVEL MEASUREMENT OF MATERIALS IS NOT PERMITTED.
2. Use box sizes that are sufficient for producing a batch size equal to one mixer load.

NOTE: Mix dry ingredients thoroughly before adding any water (approximately five minutes).

#### D. Add a small amount of water so that the mortar is just wet enough to hang on a trowel.

NOTE: Excess water will cause shrinkage and too little water will retard carbonation. Record the amount of water added so that it may be used as a guide for future batches.

#### E. Mix mortars at least 10 minutes before using to improve workability and ensure thorough mixing.

NOTE: Automatic mixers should have rubber blades. Clean mixing boards and mixing machines thoroughly after each use to prevent hardened lumps of mortar from contaminating the next batch of mortar.

1. Repointing mortars may sit 1-2 hours after initial mixing and then may be remixed to a workable consistency. This is done to reduce shrinkage.
2. Test the mix by holding a trowel with mortar on it upside down and shaking it once.
  - a. If the mortar falls off without shaking, it has too much sand.
  - b. If more than one shake is required, the mortar is too sticky or "plastic" and the lime content must be decreased.

#### F. Coloring Mortars:

1. Take samples of freshly-broken mortar from the original masonry pointing. Note color of aggregate for color-matching. DO NOT TRY TO MATCH THE COLOR OF THE BINDER.

NOTE: Use unweathered, unsoiled samples only.

2. Prepare test patties of mortar approximating the inner color of the sample and set aside to dry for at least 72 hours. Drying time may be accelerated by placing the patty sample in an oven or over a hot-plate.
3. Break the sample test patties and compare the inner portions to the original.
4. See Section 2.03 above for additional information on coloring mortars.

- G. Use repointing mortar within approximately 1-2 hours of final mixing. Retemper the mortar as necessary to maintain workability.

NOTE: Retempering is permitted to maintain workability. Remixing is not permitted. Add water at the mortar-board using a spray bottle to replace only water lost through evaporation.

NOTE: Use all mortar within two hours of gauging; throw out left over mortar; do not retemper or remix mortars after this time has elapsed.

NOTE: This time limit may vary depending upon the outside temperature (longer on cooler days and shorter on warmer days.)

- H. For guidance on repointing, see 04520-02-R.

## **END OF SECTION**

## CONCRETE

Concrete can be non-reinforced or reinforced with metal bars or wire mesh to add tensile strength. Both reinforced and non-reinforced concrete can be either cast-in-place or pre-cast. Since the concrete used in and around the Childers House is in the form of stairs, slabs and the basement floor and walls, most of it is likely cast-in-place.

Water should not be allowed to permeate the concrete's surface, if allowed it will cause more severe damage later.

## CONCRETE FOUNDATION



Figure 55. Example of concrete foundation on northeast corner.



Figure 56. Closeup of crack through concrete foundation.

## CONCRETE—BASEMENT

The problems with spalling and water leakage in the basement are directly attributed to gutter/downspout and shrub roots.



Figure 57. Crack and spalling on east side of basement wall in northwest room is due to water infiltrating from point marked in photo.



Figure 58. Water leaking into basement on east side crack after storm.



Figure 59. Northwest corner of northwest room in basement.

## CONCRETE—STRUCTURAL SUPPORTS



Figure 60. Concrete wall and concrete support pier with crack and lichen growth.



Figure 61. Closeup of spalled concrete pier with rebar subjected to weather.



Figure 62. Closeup of backside of concrete stairs with spalled concrete and rebar subjected to weather.

#### CONCRETE—STEPS



Figure 63. Front steps.



Figure 64. Steps down to basement from back patio.



Figure 65. Steps up to kitchen entrance.



Figure 66. Steps up to side screened porch.

#### **CONCRETE—PORCH/STOOP**



Figure 67. View of front stoop.



Figure 68. Closeup of northwest corner of front stoop.



Figure 69. Flaking paint over concrete on screened side porch.

**CONCRETE—BALCONY**

Figure 70. Concrete balcony.



Figure 71. Closeup of concrete balcony.

## CONCRETE—WINDOWSILLS



Figure 72. Stained concrete windowsill on basement.

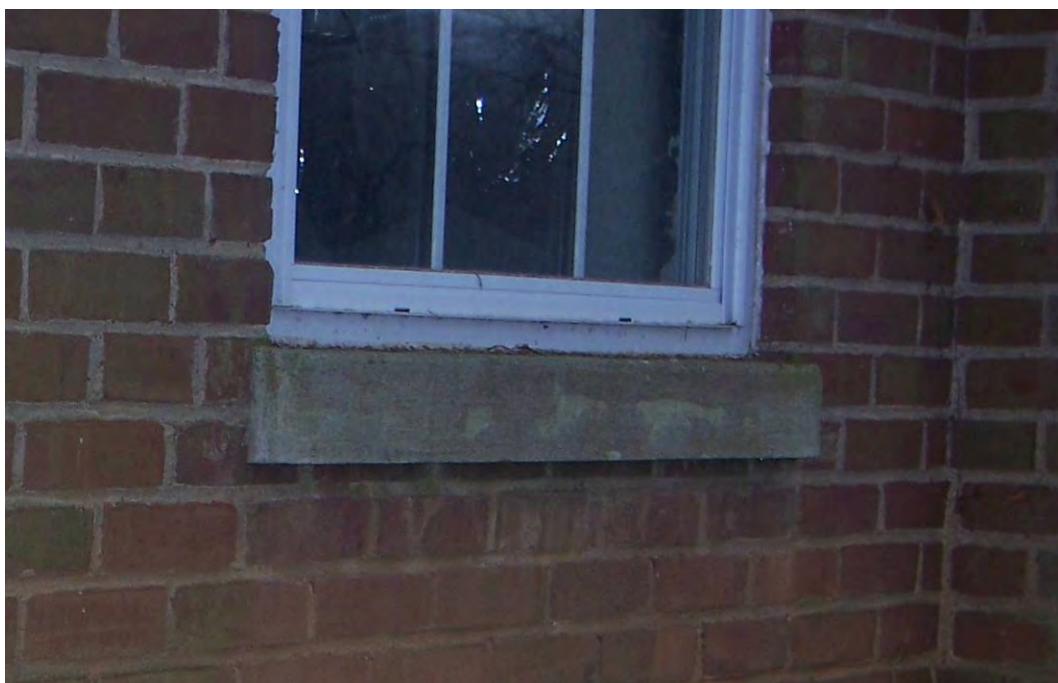


Figure 73. Example of a concrete windowsill.



Figure 74. Concrete windowsill with a broken corner.



Figure 75. Concrete windowsill with a broken corner.

## CONCRETE—LINTEL



Figure 76. Concrete lintel over garage openings.

## TREATMENT RATING 2: PRESERVE WHEREVER POSSIBLE

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

### **Statement of Importance:**

- The various concrete elements contribute to the significance of the Childers House, and its historic appearance.

### **Condition:**      *Fair– Preserve*

Fair to good - Preserve

Poor – Replace

## INVENTORY QUANTITY AND CONDITION

The various concrete elements are evaluated as Fair when:

- they are structurally and architecturally intact, and
- some concrete elements have exposed rebar due to surface spalling and weathering, and
- spalled areas on the various concrete elements should be patched with a mortar compound that is like in both appearance and mechanical properties, and
- treatment of the foundation wall is needed for mold, lichen, and efflorescence.

Minor deficiency of the various concrete elements may exist where:

- Repairs are needed as necessary with materials that are like in appearance and mechanical properties, and/or

- the base of the building and the north facade need to be treated for mold and lichen growth as detailed in this chapter, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

The concrete walls and flooring in the basement are in need of attention. Water/moisture infiltration is a problem, and if allowed to continue, more serious damage will occur.

During inspection, there was standing water on the west side of the northwest basement room. The walls around this area are also water stained. Poor placement and design of gutters and downspouts around the house most likely caused these problems.

## **MAINTENANCE / MANAGEMENT GUIDELINES FOR CONCRETE**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, replace them only when necessary.

The following recommendations for care of historic concrete are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

Following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

### **PROTECT AND MAINTAIN**

#### *Recommended*

- Provide proper drainage so water does not stand or accumulate.
- Clean concrete only when necessary to halt deterioration or remove heavy soiling. Chemical cleaning, if utilized, should be conducted by experienced professionals.
- Tests should be conducted to determine the gentlest effective cleaning method possible; e.g., hand washing or low- to medium-pressure water cleaning. Tests should be observed over a sufficient period so that both the immediate and the long-range effects are known.

#### *Not Recommended*

- Applying non-specified paint or other coatings such as stucco or insulation.
- Cleaning surfaces not heavily soiled.
- Cleaning without testing or without sufficient time for testing results to be of value.
- Sandblasting using dry or wet grit or other abrasive agent, high-pressure water-blasting or caustic solutions. These methods of cleaning or paint removal may permanently erode wall surface and accelerate deterioration.
- Wet cleaning when there is any possibility of freezing temperatures.

***REPAIR******Recommended***

- Repair any cracks in concrete by sealing with specification-approved sealant.
- Patch damaged sections with in-kind material finished to match existing.

***Not Recommended***

- Replacing or rebuilding a major portion of foundation wall that could be repaired.
- Patching concrete without removing the source of deterioration.
- Patching with substitute material that is physically or chemically incompatible with the original concrete.

***REPLACE******Recommended***

- Repair damaged concrete too deteriorated to patch by cutting damaged material back to remove the source of deterioration (often corrosion of metal reinforcement bars).
- New patch must be applied with in-kind material finished to match existing.
- Replace sections too deteriorated to repair using materials compatible with the original materials.

## TYPES OF CRACKS IN CONCRETE AND TYPICAL CAUSES<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**03732-02**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

Cracks can be broadly classified as either active or dormant. If they are active, they show some movement in direction, width, or depth over a measured period. If the cracks are dormant, they remain unchanged. Some dormant cracks are of no danger, but if left un-repaired, cracks provide channels for moisture penetration, which can lead to future damage. For guidance on patching dormant cracks, see 03732-01-R "Repairing Cracks in Concrete by Injecting Epoxy Resin."

Cracks can be more specifically classified based on three factors:

1. direction
2. width
3. depth of the crack

They may be longitudinal, transverse, vertical, diagonal, or random. They may range in size from less than 1 mm (fine) to between 1 and 2 mm (medium) to over 2 mm (wide). The following are some crack classifications and a brief description.

- Pattern Cracking: Fine openings in regular pattern usually due to inconsistent volume of concrete, which is lower, near the surface.
- Checking: Shallow openings, closely and irregularly spaced.
- Hairline Cracking: Small cracks, randomly placed, in exposed areas.
- D-Cracking: Fine cracks at close intervals in a progressive random pattern.

Cracks can occur in hardened or unhardened concrete and may be caused by some of the following conditions:

- Shrinkage cracking: A crack that occurs only in unhardened concrete. It is often seen as relatively straight lines running parallel with the span of the floor.
- Plastic cracking: A type of shrinkage crack that also only occurs in unhardened concrete. It is seen as diagonal lines in the top of a slab. It is often caused by rapid drying of the surface due to delays in applying the curing membrane.
- Settlement cracking: Caused by local restraining of unhardened concrete around reinforcement or some other obstruction.
- Structural cracking: Usually a result of corrosion of the reinforcing steel or structural over stressing.
- Tension cracking: Only occurs in reinforced concrete and is caused by elongation of the reinforcement in tension zones. It is sometimes seen around columns in flat slabs and on beam soffits near the middle of a span.
- Rust cracking: The most common and most serious cause of structural cracking caused by inadequate reinforcement cover. It gradually develops at varying rates over time depending upon the degree of protection offered by the concrete cover.
- Thermally induced cracking: Results from stresses produced by temperature changes.

### END OF SECTION

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

# PATCHING SPALLED CONCRETE<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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03732-04

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on patching spalls and holes in concrete with a cementitious patching material.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage, and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

### 1.02 QUALITY ASSURANCE

- A. Masonry and Concrete Repair: Prepare sample panels of size indicated for each type of masonry material indicated to be patched, rebuilt, or replaced.

## PART 2---PRODUCTS

### 2.01 MANUFACTURERS

- A. Sika Corporation  
201 Polito Ave.  
Lyndhurst, NJ 07071  
201/933-8800
- B. General Polymers
- C. Master Builders

### 2.02 MATERIALS

- A. Concrete Patching Material: One component, early strength, cementitious patching material "SikeTop 222 or 223" (Sika Corporation); "TPM 723" (General Polymers); "Vertipatch" (Master Builders), or approved equal.
- B. Water: Clean, free of oils, acids, alkalis, and organic matter.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

**2.03 EQUIPMENT**

- A. Trowels
- B. Chisels
- C. Stiff bristle brushes (non-metallic)

**PART 3---EXECUTION****3.01 PREPARATION**

- A. Protection:
  1. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
  2. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles, which must remain in operation during course of masonry restoration work.
  3. Contractor shall test those areaway drains, window well drains, etc., which will be used to assure that drains are functioning properly prior to performing masonry restoration operations in those areas. The Contractor shall report immediately to the Construction Engineer the location of drains, which are found to be stopped up, or blocked.
  4. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
  5. Protect sills, ledges, windows, and projections from patching material dropings.

**3.02 ERECTION, INSTALLATION, APPLICATION**

- A. Remove deteriorated concrete at spalls to sound material. Grind, chisel, or saw cut deep undercut around perimeter of patch. Clean with compressed air. Thoroughly remove any concrete showing traces of oils or grease.
- B. Thoroughly wet patched area prior to casting concrete patching material. If cement patching material manufacturer recommends a different procedure, such procedure is to be followed and executed in accordance with published instructions and in accordance with approved test patch.
- C. Install cement-patching material in strict accordance with manufacturer's published instructions.
- D. Finish surface to match surface being patched, by grinding, troweling, sacking, or brushing.

**3.03 ADJUSTING/CLEANING**

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
- B. Use of metal scrapers or brushes will not be permitted.
- C. Use of acid or alkali cleaning agents will not be permitted.

**END OF SECTION**

# REMOVING SURFACE DIRT FROM CONCRETE<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**03710-15**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

THE CLEANING OR REMOVAL OF STAINS FROM CONCRETE MAY INVOLVE THE USE OF LIQUIDS, DETERGENTS OR SOLVENTS WHICH MAY RUN OFF ON ADJACENT MATERIAL, DISCOLOR THE CONCRETE OR DRIVE THE STAINS DEEPER INTO POROUS CONCRETE. USE THE PRODUCTS AND TECHNIQUES DESCRIBED HERE ONLY FOR THE COMBINATIONS OF DIRT/STAIN AND CONCRETE SPECIFIED.

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on removing dirt from concrete using a detergent, chemical solvent or steam.
- B. Dirt encompasses deposits of almost any material in a location where it is not wanted, but it usually includes fine, dark-colored solid particles, often surrounded by some kind of oily film. It is particularly troublesome on architectural and decorative concrete, including exposed aggregate surfaces.
- C. Safety Precautions:
  1. DO NOT save unused portions of stain-removal materials.
  2. DO NOT store any chemicals in unmarked containers.
  3. EXCELLENT VENTILATION MUST BE PROVIDED WHEREVER ANY SOLVENT IS USED. USE RESPIRATORS WITH SOLVENT FILTERS.
  4. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise, it will continue etching the concrete even though the stain is gone.
  5. Provide adequate clothing and protective gear where the chemicals are indicated to be dangerous.
  6. Have available antidote and accident treatment chemicals where noted.
- D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage, and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## PART 2---PRODUCTS

### 2.01 MATERIALS

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (\*).

#### A. Hydrochloric Acid:

1. A strong corrosive irritating acid.
2. Other chemical or common names include Chlorhydric acid; Hydrogen chloride; Muriatic acid\*; Marine acid\*; Spirit of salt\*; Spirit of sea salt\*.
3. Available from chemical supply house, drugstore, hardware store.

#### B. Detergent:

CAUTION: SOME DETERGENTS CONTAIN AMMONIA AND MAY REACT VIGOROUSLY WITH HYDROCHLORIC ACID.

#### C. Clean, potable water

#### D. Clean white cloths or towels

### 2.02 EQUIPMENT

#### A. Steam cleaning equipment

#### B. Stiff bristle brushes (non-metallic)

## PART 3---EXECUTION

### 3.01 PREPARATION

#### A. Protection:

1. Provide adequate wash solutions (i.e. water, soap, and towels) before starting the job.
2. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise, it will continue etching the concrete even though the stain is gone.

### 3.02 ERECTION, INSTALLATION, APPLICATION

NOTE: Do not try more than one treatment on a given area unless the chemicals used from prior treatment have been washed away.

#### A. Brush affected area with water and strong detergent.

#### B. Rinse the area thoroughly with clean, clear water and blot the surface dry with clean towels.

#### C. Repeat the treatment as necessary until the desired level of cleanliness is achieved.

-OR-

#### A. Mix 1 part hydrochloric acid in 19 parts water.

- B. Scrub the concrete surface with this solution.

NOTE: This is a strong method and may roughen the concrete.

- C. Rinse the area thoroughly with clean, clear water; blot the surface dry with clean towels.
- D. Repeat the treatment as necessary until the desired level of cleanliness is achieved.

-OR-

- A. Steam cleaning is generally effective and may be used in combination with proprietary materials, such as detergents for dirt removal.
- B. If there is oil present in the dirt, follow the procedure described for removing lubricating oil, see 03710-31-R "Poulticing Lubricating and Petroleum Oil Stains from Concrete."

END OF SECTION

## REPAIRING CRACKS IN CONCRETE BY INJECTING EPOXY RESIN<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**03732-01**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on patching cracks in concrete by injecting an epoxy adhesive.
- B. Epoxy Injection should be used for DORMANT CRACKS - cracks that remain unchanged. Dormant cracks generally pose little danger. However, if left unrepairs, they will provide channels for moisture penetration.
- C. The calculated maximum crack width for concrete should not exceed 0.3 mm. Consult a professional to determine the cause for cracking and its source, as superficial repairs can aggravate the problem.
- D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage, and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)
- E. For guidance in monitoring cracks, see 04200-02-S.

#### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM),  
100 Barr Drive  
West Conshohocken, PA 19428  
(610) 832-9585  
or FAX (610) 832-9555.

### PART 2---PRODUCTS

#### 2.01 MANUFACTURERS

- A. Abatron, Inc.  
5501 95th Ave.  
Kenosha, WI 53144

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

800/445-1754 or 414/653-2000

B. Sika Corporation  
201 Polito Ave.  
Lyndhurst, NJ 07071  
201/933-8800

## 2.02 MATERIALS

- A. Epoxy Resin (Abatron, Inc., Sika Corp.), or approved equal.
1. For Fine Cracks:
    - a. Epoxy shall be a two-part type, low viscosity epoxy adhesive material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.
    - b. Characteristics of Components:
      - 1) Component A - shall be a blend of modified epoxy resins.
      - 2) Component B - shall be a blend of modified amine curing agents.
    - c. Test Method Requirements:
      - 1) Component A - Brookfield RVT, 700 maximum; Viscosity @ 77 +/- 3°F., cps; Spindle No. 2 @ 20 rpm.
      - 2) Component B - Brookfield RVT, 240 maximum; Viscosity @ 77 +/- 3°F, cps; Spindle No. 2.
    - d. Properties of Combined Components: When mixed in the ratio of two parts Component A to one part Component B by volume, or 100 parts Component A to 44 parts Component B by weight, shall be:
      - 1) Potlife, 60g @ 77 +/- 3°F., minutes; 25 minutes maximum.
    - e. Properties of the Cured Adhesive: When cured for seven days @ 77 +/- 3°F., unless otherwise specified, shall be:
      - 1) Ultimate Tensile Strength: ASTM D638; 8000 minimum.
      - 2) Compressive Yield Strength, psi: ASTM D695\*; 15,000 minimum.
      - 3) Heat Deflection Temperature: ASTM D648\*; 130 F. minimum.

NOTE: Test specimens must be cured in a manner such that the peak exothermic temperature of the adhesive does not exceed 77°F.

2. For Wide Cracks:

- a. Epoxy shall be a two-part gel epoxy adhesive material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.
- b. Properties of Combined Components: When mixed in the ratio of two parts Component A to one part Component B by volume, or 100 parts Component A to 34 parts Component B by weight shall be:
  - 1) Potlife, 200g @ 77°F. +/- 3°F., minutes.
- c. Properties of the Cured Adhesive: When cured for seven days @ 77 degrees F. +/- 3 °F., unless otherwise specified, shall be:
  - 1) Ultimate Tensile Strength: ASTM D638; 1,500 psi minimum.
  - 2) Compressive Yield Strength: ASTM D695; 6,000 psi minimum.
  - 3) Heat Deflection Temperature: ASTM D648; 105 F. minimum.

B. Surface Seal: (Epoxy Mortar or Oil-free Clay)

1. Description: The surface seal material is that material used to confine the injection adhesive in the joints or cracks during injection and cure.

2. Properties: The surface seal material shall have adequate strength to hold injection fittings firmly in place and to resist injection pressures adequately to prevent leakage during injection. The material shall not leave a residue upon removal.

NOTE: Provide adhesive crack fillers and other related materials that are compatible with one another and with substrates under conditions of severe weather, demonstrated by sealant manufacturer based on testing and field experience.

## 2.03 EQUIPMENT

### A. Equipment for Injection:

1. Type: The equipment used to meter and mix the two injection adhesive components and inject the mixed adhesive into the crack shall be portable, positive displacement type pumps with interlock to provide positive ratio control of exact proportions of the two components at the nozzle. The pumps shall be electric or air powered and shall provide in-line metering and mixing.
2. Discharge Pressure: The injection equipment shall have automatic pressure control capable of discharging the mixed adhesive at any pre-set pressure up to 200 psi + 5 psi and shall be equipped with a manual pressure control override. For injection of the gel epoxy, the equipment shall be equipped with the above features and be able to pump at up to 5,000 psi.
3. Ratio Tolerance: The equipment shall have the capability of maintaining the volume ratio for the injection adhesive prescribed by the manufacturer of the adhesive within a tolerance of + 5% by volume at any discharge pressure up to 200 psi. For gel epoxies, the ratio will be checked by weight at up to 5,000 psi.
4. Automatic Shut-Off Control: The injection equipment shall be equipped with sensors on both the Component A and B reservoirs that will automatically stop the machine when only one component is being pumped to the mixing head.
5. The manufacturer of the injection equipment and the manufacturer of the epoxy resin adhesive for injection shall be the same.

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Examine the nature and severity of the crack:
  1. What direction are the cracks going and where are they the widest?
  2. Note sloped floors, bulging walls and doors that do not fit.
- B. Determine the probable cause:
  1. Foundation erosion
  2. Decay of materials
  3. Structural failure
  4. Change in materials or geometry
  5. Thermal and moisture changes
- C. Determine possible consequences if left unrepaired.
- D. Evaluate alternative methods of repair.
- E. For cracks associated with thermal movement, look for:
  1. Horizontal or diagonal cracks near the ground at piers in long walls due to horizontal shearing stresses between the upper wall and the wall where it enters the ground.

2. Vertical cracks near the ends of walls.
3. Vertical cracks near the top and ends of the facade.
4. Cracks around stone sills or lintels: due to expansion of the masonry against both ends of the tight fitting stone piece that cannot be compressed.

### 3.02 PREPARATION

#### A. Surface Preparation:

1. Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.
2. Surfaces adjacent to joints or other areas of application shall be cleaned of dirt, dust, grease, oil, or other foreign matter detrimental to bond of epoxy injection surface seal system.
3. Entry ports shall be provided along the crack at intervals of not less than the thickness of the concrete member at that location.
4. Surface seal material shall be applied to the face of the crack or end. For through cracks, surface seal shall be applied to both faces.
5. Enough time for the surface seal material to gain adequate strength shall pass before proceeding with the injection.

### 3.03 ERECTION, INSTALLATION, APPLICATION

A. If, before repairs are made, the crack is still damp, be sure to use an epoxy appropriate for damp conditions.

B. Seal both sides of cracks with an epoxy mortar or oil-free clay, leaving small holes through which epoxy resin will be injected. 1/8" to 1/4" diameter tubing can be used to form holes. Holes should be 2"-4" long, roughly 8" apart.

C. Inject 2-component epoxy using device as provided by manufacturer.

D. Injection of epoxy adhesive shall begin at lower entry port and continue until there is an appearance of epoxy adhesive at the next entry port adjacent to the entry port being pumped.

E. When epoxy adhesive travel is indicated by appearance at the next adjacent port, injection shall be discontinued on the entry port being pumped, and epoxy injection shall be transferred to next adjacent port where epoxy adhesive has appeared.

F. Perform epoxy adhesive injection continuously until cracks are completely filled.

G. If port-to-port travel of epoxy adhesive is not indicated, the work shall immediately be stopped and the engineer notified.

H. When cracks or joints are completely filled, epoxy adhesive shall be cured for sufficient time to allow removal of injection or port sealing devices.

I. The outermost quarter inch of the crack shall be filled with a colored epoxy material of the installers' choice subject to prior approval of the **Cultural Resources POC**. The colored epoxy filler shall match the existing material, which it is filling and shall not be discernible from a distance of 15 feet.

### 3.04 ADJUSTING/CLEANING

A. Upon completion of work, remove all seal material and other residue from site. Remove and clean exposed surfaces of residue or staining resulting from this work.

**END OF SECTION**

## ROOFING—ASPHALT SHINGLES



Figure 77. Three-tab asphalt shingles on kitchen addition.



Figure 78. Three-tab asphalt shingles and metal flashing on hyphen between kitchen addition and main house.



Figure 79. Three-tab asphalt shingles below rear shed dormer.



Figure 80. Three-tab asphalt shingles and plastic pipe that stops short of gutter.



Figure 81. Lichen growth on front of roof near middle dormer.



Figure 82. Lichen growth on north side of south chimney.



Figure 83. Flashing problems at base of rear shed dormer.



Figure 84. Fallen leaves that have not been removed in window well on south side of house.



Figure 85. Incorrect connection between rolled asphalt roofing on screened porch and three-tab asphalt shingles.



Figure 86. Use of caulk to patch three-tab asphalt shingles below rear shed dormer.

## TREATMENT RATING 4: PRESERVE WHERE THERE IS NO COMPELLING REASON FOR REMOVAL

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

### **Statement of Importance:**

- The three-tab asphalt shingles are similar to what may have been used on the original roof; however, they do not represent a substantial amount of historic fabric, are not distinctive, and do not contribute to the significance of the Childers House.

### **Condition:**    *Good – Preserve (replace in-kind)*

Fair to good - Preserve

Poor - Replace

## INVENTORY QUANTITY AND CONDITION

The asphalt shingled roof is evaluated as Good when:

- the roof is structurally and architecturally sound and performing its intended purpose, and
- there are few or no cosmetic imperfections, and
- the roofing is inspected yearly for signs of wearing or failure, and
- roofing is cleaned and replaced in areas where the deterioration is beyond repair.

Minor deficiency of the asphalt shingled roof exists where:

- The roofing is inspected yearly for wear and localized failure, and/or
- roofing is replaced where it no longer functions to maximum capacity, and/or
- if inspection reveals globalized damage, then entire roof should be replaced.

## MAINTENANCE / MANAGEMENT GUIDELINES

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic roofing are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

## ***IDENTIFY, RETAIN, AND PRESERVE***

### ***Recommended***

- Identifying, retaining, and preserving roofs--and their functional and decorative features--that are important in defining the overall historic character of the building.
- This includes the roof's shape, such as hipped, gambrel, and mansard; decorative features, such as cupolas, cresting chimneys, and weathervanes; and roofing material such as slate, wood, clay tile, and metal, as well as its size, color, and patterning.

### ***Not Recommended***

- Radically changing, damaging, or destroying roofs, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Removing a major portion of the roof or roofing material that is repairable, and then reconstructing it with new material in order to create a uniform or "improved" appearance.
- Changing the configuration of a roof by adding new features such as vents, or skylights so that the historic character is diminished.
- Applying paint or other coatings to roofing material, which has been historically uncoated.

## ***PROTECT AND MAINTAIN***

### ***Recommended***

- Protecting and maintaining a roof by cleaning the gutters and downspouts and replacing deteriorated flashing. Roof sheathing should also be checked for proper venting to prevent moisture condensation and water penetration; and to insure that materials are free from insect infestation.
- Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.
- Protecting a leaking roof with plywood and building paper until it can be properly repaired.

### ***Not Recommended***

- Failing to clean and maintain gutters and downspouts properly so that water and debris collect and cause damage to roof fasteners, sheathing, and the underlying structure.
- Allowing roof fasteners, such as nails and clips to corrode so that roofing material is subject to accelerated deterioration.
- Permitting a leaking roof to remain unprotected so that accelerated deterioration of historic building materials—masonry, wood, plaster, paint, and structural members—occurs.

## ***REPAIR***

### ***Recommended***

- Repairing a roof by reinforcing the historic materials, which comprise roof features.
- Repairs will also generally include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of features when there are surviving prototypes such as cupola louvers, dentils, dormer roofing; or slates, tiles, or wood shingles on a main roof.

### ***Not Recommended***

- Replacing an entire roof feature such as a cupola or dormer when repair of the historic materials and limited replacement of deteriorated or missing parts are appropriate.

- Failing to reuse intact slate or tile when only the roofing substrate needs replacement.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the roof or that is physically or chemically incompatible.

## ***REPLACE***

### *Recommended*

- Replacing in-kind an entire feature of the roof that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include a large section of roofing, or a dormer or chimney.
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

### *Not Recommended*

- Removing a feature of the roof that is irreparable, such as a chimney or dormer, and not replacing it; or replacing it with a new feature that does not convey the same visual appearance

## MINOR REPAIRS TO ASPHALT ROLL-ROOFING OR BUILT-UP ROOFING<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**07321-01**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### **PART 1---GENERAL**

#### **A.01 SUMMARY**

- A. This procedure includes guidance on making minor repairs to asphalt and built-up roofing membranes. Some problems include open lap joints, blisters, splits, holes, ridges, undulations, wrinkles, and cracks.

- 1. Ridges:

NOTE: RIDGES SHOULD BE REPAIRED AS SOON AS POSSIBLE.  
CONTINUAL STRESS ON A RIDGE CAN LEAD TO SPLITTING OF THE MATERIAL.

- a. Ridges are firm and do not yield under pressure. They may result from the substrate being uneven before the felt was laid, or from moisture distorting the substrate.
  - b. Ridging usually occurs over or near joints between boards. The ridges expand as entrapped moisture vaporizes. Ridges become a problem when they interfere with drainage or when the roof begins to leak.

- 2. Undulations:

- a. Unlike ridging, undulations will yield to pressure.
    - b. Distortions of felts may result from the way the rolls were stored (flat instead of on end), inadequate pressure applied while laying, poor application of bitumen compound, or if entrapped moisture becomes vaporized.

- 3. Blisters:

- a. Blisters will yield to pressure.
    - b. Blisters begin with the expansion of trapped air and/or moisture pockets and can result from inadequate pressure during laying.
    - c. Full Membrane Blistering: Usually occurs when no separating layer is provided between the asphalt and the substrate.
    - d. Inter-layer Blistering:
      - When large blisters result from additional air and water drawn in from outside through the top layer of the felt.
      - Not a common problem, but can result if the 2nd layer does not adhere well to the 1st layer due to the accumulation of dirt or dust.

—OR—

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- If a blow develops in the 1st layer, the 2nd layer becomes thin at that point and allows air and moisture to penetrate between the layers. This can create the potential for a blister to develop.

- e. A blister usually develops under the cap sheet of the membrane.
- f. Inter-layer blistering is most common with unsurfaced or mineral surfaced felts on vertical or sloping surfaces. However, high performance membranes can reduce the incidence of this occurring.

4. Top Pitting:

NOTE: NO REMEDIAL TREATMENT IS RECOMMENDED, AS THIS TYPE OF BLISTERING SHOULD NOT AFFECT THE EFFICIENCY OF THE WATERPROOFING.

- a. Miniature surface blistering of the bitumen coating (especially with BS747 Type 1E and 2E mineral-surfaced felts).
- b. The blisters may range in size from 1mm to 3mm.
- c. Top pitting may be caused by:
  - 1) Trapped air and/or moisture in the manufacture of the material.
  - 2) Oliensis: Incompatibility of the saturating bitumen with the coating bitumen (i.e. oils from the coating separate as an incompatible reaction with the saturant bitumen).
- d. If numerous across the surface, the coating may separate from the membrane and result in a loss of surfacing.

5. Cockling:

- a. Rounded ridging usually in line with the length of the material.
- b. Cockles sometimes develop as a result of thermal expansion (especially with Polyester felts, which are heat sensitive). The heat from the bonding bitumen during application can create minor wrinkling or cockles, which usually disappears as the material settles.
- c. Most common in fiber and asbestos base felts as they tend to expand when their moisture content increases.
- d. Cockling is less likely in coated felts especially those with a glass or polyester base.

6. Blowing:

- a. Blows are bubbles that develop on the surface from gas moving through the asphalt. The heat of the asphalt during application causes the air to expand and creates steam by raising the temperature of the moisture.
  - b. Blowing is most common in vertical application where there is no separating layer between the asphalt and the substrate.
- B. Problems with mineral-surfaced, asphalt roll roofing and built-up roofing membranes are usually related to sun exposure, and excessive moisture. Exposure to the sun may cause the asphalt to dry out; resulting in cracking of the surface, separation of plies, and may eventually require replacement of the entire membrane.
- C. The repairs described in this procedure are ONLY temporary. For roofs that are near the end of their useful life, these repairs may provide an extra 3 to 4 years of service, enough time to start planning for a new roof. For roofs that are

relatively new, these techniques will provide protection while the cause of the problem is being investigated and repairs that are more permanent are planned.

- D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)
- E. For additional information on factors contributing to roof deterioration, see 07500-02-S.
- F. For guidance on inspecting for sources of flat roof failures, see 07500-01-S.

## 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Conshohocken, PA 19428, (610) 832-9585 or FAX (610) 832-9555.

## 1.03 DEFINITIONS

- A. Asphalt--A dark brown to black semi-solid hydrocarbon obtained from crude petroleum. See ASTM D 312-78.
- B. Asphalt cement--Trowelable black asphaltic mastic used for flashing and roof repairs. Contains fiber additives to thicken the mixture so that it will not run down vertical surfaces. Also called roofing cement, flashing cement, plastic asphalt cement, plastic cement, roofing tar, bitumen, and elastic cement.
- C. Bitumen--A semisolid mixture of complex hydrocarbons derived from coal or petroleum, as coal-tar pitch or asphalt; before application, usually dissolved in a solvent, emulsified, or heated to a liquid state.
- D. Built-up roofing--A continuous roof covering made up of laminations or plies of saturated or coated roofing felts, alternated with layers of asphalt or coal-tar pitch and surfaced with a layer of gravel or slag in a heavy coat of asphalt or coal-tar pitch or finished with a cap sheet; generally used on flat or low-pitched roofs.
- E. Bituminous coating--An asphalt or tar compound used to provide a protective finish for a surface.
- F. Coal tar bitumen--A dark brown to black, semi-solid hydrocarbon, a residue distillation of coal tar. It is used for the construction of low-pitch built-up roofs. It differs from coal tar pitch because of a different volatility. See ASTM D, 450, Type III.
- G. Coal tar pitch--Similar to coal tar bitumen. Used for ead-level or low-slope built-up roofs. See ASTM D 450, Type I.

- H. Lap cement--Thinner than asphalt cement, this is used to make watertight joints at the laps of roll roofing.
- I. Roof restorant--The restorant penetrates the existing roofing felts and plasticizes the age-hardened bitumen to its originally installed state. It will not, however, stop or seal leaks. In addition, a deep coating on the surface provides a weathering surface and a binder for the replacement aggregate. Also called roof coating or roof paint.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

##### A. Storage and Protection:

- 1. Store roof system materials in a dry location. Outside, they should be placed on platforms off the ground or roof deck, covered with waterproof coverings, which will not produce condensation.
- 2. Store roll materials on end to prevent their becoming deformed or damaged. Remove moisture, dirt, snow, or ice from roofing bitumens before they are heated.
- 3. Replace lids on cans of material stored on the job site.
- 4. Protect water-based materials from freezing.

#### 1.05 PROJECT/SITE CONDITIONS

##### A. Environmental Requirements:

- 1. It is extremely important that the roof deck be dry at the time roofing operations commence, to avoid later problems with water vapor trapped under the membrane. A deck should not be roofed when rain, snow, or frost is present in or on the deck material.
- 2. Cold temperatures: Apply roofing materials only when correct bitumen temperatures can be maintained. "Wind chill" and surface temperature affects application temperatures. Keep surface temperature and asphalt thermometers at the work site.
- 3. Hot temperatures: In hot weather the bitumen will cool slowly, which can lead to sticking, making the membrane susceptible to physical damage from mechanical equipment and foot traffic.
- 4. Wind: Wind can blow hot materials, mastics, and coatings causing damage to surrounding property and making the handling of roll materials difficult.

### PART 2---PRODUCTS

#### 2.01 MATERIALS

- A. Sand and/or gravel to match existing or historic appearance.
- B. Asphalt Roof Felts:
  - 1. BS747 Type 1 fiber base felts - suffer from inter-layer blistering.
  - 2. Type 2 Asbestos base felts - inter-layer blistering is less common.
  - 3. Type 3 Glass fiber felts - Extremely resistant to blistering.
  - 4. Polyester felts - some resistance to blistering.
- C. Asphalt cement (also called, among others, flashing cement or roofing cement).
- D. Roof Coating (also called roof paint and roof restorant)
- E. 1-1/2" Flathead galvanized roofing nails
- F. Turpentine

## 2.02 EQUIPMENT

- A. Utility knife or hook-nosed linoleum knife
- B. Hammer
- C. Trowel
- D. Stiff bristle brushes (non-metallic)
- E. Long handled brush or broom
- F. Ladders, scaffolding as required

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Inspect the surface for obvious cracks, blisters, or ridges in the membrane.
- B. Check also for bald spots, areas where the gravel (built-up roof) or mineral granules (roll roofing) are missing.
- C. Be especially diligent inspecting where the roof meets parapets, chimneys, vents, and other vertical surfaces.
- D. If possible, check the underside of the rafters and decking for water stains or rot, which would indicate water infiltration, realizing that water, could migrate through layers of roof plies from distant points.
- E. Check the interior, especially ceilings and around fireplaces and vent pipe locations, for clues as to the location of any leaks.
- F. See also roofing section of 01800-01-S, "Checklist for the Routine Inspection of Buildings."

### 3.02 PREPARATION

- A. Protection:
  - 1. When transporting liquid bitumen to the roof, protect adjacent surfaces and permanent equipment by providing masking or covering. Secure coverings without the use of adhesive backed tape or nails. Impervious sheeting, which produces condensation, should not be used.
  - 2. Keep a portable fire extinguisher on hand where work is being done.
  - 3. At the end of each workday, provide temporary roofing when existing roof is being opened for repair or replacement. Provide an effective way to divert water runoff away from open roof.
- B. Surface Preparation:
  - 1. Sweep exposed felts clean of loose aggregate, dirt, and silt with stiff bristled brush or broom. Sweep at least six inches into embedded aggregate in all directions. Clean all roof surfaces, including parapets, copings, and flashings. Sometimes this can be done using a long-handled push broom. In the case of a tar and gravel roof, you may have to cut the gravel off by hand or use a gravel-removing machine. Parapet cleaning should include brushing of any efflorescence from the brickwork using stiff, non-metallic bristle brushes. Do not begin repair of flashings until completion of all pointing or resetting of parapet units and repair of coping joints.
  - 2. Go over the entire roof area with roofer's chalk, marking areas where repair work is to be done.

### 3.03 EXECUTION, INSTALLATION, APPLICATION

- A. Repairing open lap joints on roll roofing:
  1. Force lap cement or asphalt cement under open seam. Weight it down with heavy weight until it is dry.
  2. If it pops again, slit wrinkle being careful not to cut sound layers of roofing below.
    - a. Using 1-1/2 inch galvanized roofing nails secure both sides of the slit.
    - b. Using 90-lb. roofing felt, cut a patch large enough to cover the nail heads with a 2 inch overlap on all sides.
    - c. Coat the back of the patch with asphalt cement and press it into place over the nails.
    - d. Nail the edges of the patch with nails spaced about 1 inch apart and cover the nail heads with more asphalt cement.
    - e. Finish the patch by sprinkling light colored fine gravel or sand over the wet cement.

DO NOT ELIMINATE THIS LAST STEP. THE GRAVEL OR SAND REFLECTS SUNLIGHT THUS SLOWING THE DRYING OUT PROCESS

- B. Repairing Small Blisters:
  1. If no leaks are evident, apply a solar reflective treatment (see Section 3.03 B.3. below).

—OR—

Starcut the blister with a hook-nosed linoleum knife or a utility knife to release trapped air,

- a. If the felt layers beneath the surface are dry, proceed with the repair.
- b. If they are damp, deepen the cut down to the wood sheathing and let the roofing dry out before proceeding. A portable electric heater-fan or hair dryer can be used to speed up the process.
- c. Patch the area and apply a solar reflective treatment (see Section 3.03 B.3. below).

—OR—

Release entrapped moisture by installing drying units with evaporation tubes (see manufacturer's instructions for installation procedures).

2. If leaks are present, allow entrapped moisture to dry and then remove the felts and replace with new.
3. To Prevent Blistering: Apply chippings over the surface (a form of solar reflective treatment): Chippings are usually light colored, of limestone, granite, gravel, calcite or feldspar, 6-10 mm in size set in bitumen compound after the asphalt is laid.
  - a. Advantages of chippings:
    - 1) Helps cool the membrane.
    - 2) Helps hold down the membrane.
  - b. Disadvantages of chippings:
    - 1) Outlets may become blocked.
    - 2) Leaks in roof are difficult to locate and bonded chippings are difficult to remove.
  - c. Alternatives of chippings include mineral-surfaced roofing and liquid-applied surface coatings (very effective on top of glass-base felts, but not so effective with others).

- C. Repairing Undulations:
    - 1. One alternative is to remove and relay the roof with new felts.
    - 2. If not a serious problem, that is the problem will not be exacerbated by foot traffic on the roof, then an application of solar reflective treatment should aid in reducing the spread of undulations.
  - D. Repairing larger damaged areas on either built-up or roll roofing:
    - 1. Cut out damaged plies leaving sound layers in tact.
    - 2. Dip knife in turpentine periodically while cutting to keep the blade free of tar and felt fibers, and pull out the layers of felt individually.
    - 3. If water has soaked the felt, remove all the roofing within the rectangle, down to the sheathing and dry the area thoroughly.
    - 4. With the damaged area removed, apply asphalt cement under loose edges of cuts and over the entire cut out area.
    - 5. Using 90-lb. roofing felt, cut out patches the same size as the cutout. Press first patch into asphalt cement. Apply another coating of asphalt cement to cutout and press another patch into place. Repeat process until the patch is even with the surrounding roof. The number of layers will depend on the depth of the cutout.
    - 6. Cut a final patch of either roofing felt or mineral roll roofing, which will overlap the cutout area by 2 inches on all sides. Cover the bottom of the final patch with asphalt cement, press in place, and nail edges with nails spaced about 3/4 to 1 inch apart. Cover nail heads with asphalt cement and sprinkle fine gravel or sand over, as in A.3.above.
  - E. Repairing cracks in Asphalt Flashing:
    - 1. Clean the area of any gravel or other debris.
    - 2. Coat area around crack with asphalt cement extending 6 inches beyond crack in all directions.
    - 3. Lay a piece of 90-lb. roofing felt in the cement maintaining the 6-inch overlap.
    - 4. Repeat steps (2) and (3).
    - 5. Finish patch with a final coat of asphalt cement and lay sand or gravel on the horizontal surfaces.
  - F. If there are simply bald spots on the surface, sweep up any dirt and debris; paint area with roof coating and re-spread or add more gravel.
- NOTE: DO NOT use reflective paints instead of sand or gravel, except on vertical portions of flashing. Though it is not fully understood why, reflective paints encourage wrinkling, a potentially serious form of deterioration.
- G. Inspect patch at least twice a year to make sure it is still sound.

## **END OF SECTION**

## WOOD--DOORS

Doors are hinged, sliding, or folding barriers made of wood, metal, or glass. They are used for opening and closing an entrance to a building, room, or cabinet. Exterior doors protect from the elements, provide safety, and provide accessibility in case of fire. Interior doors act as noise barriers, provide privacy, and serve to separate different uses inside the building.

The Childers House has five entrances to the main building and two garage doors. With the exception of the door between the screened porch and the living room, all doors appear to be original.

The interior doors are mostly original. The original doors are six-paneled, wood hinged doors.

The overall condition of the doors of the Childers House is relatively good.



Figure 87. Wood screen door.



Figure 88. Outside of wood front door.

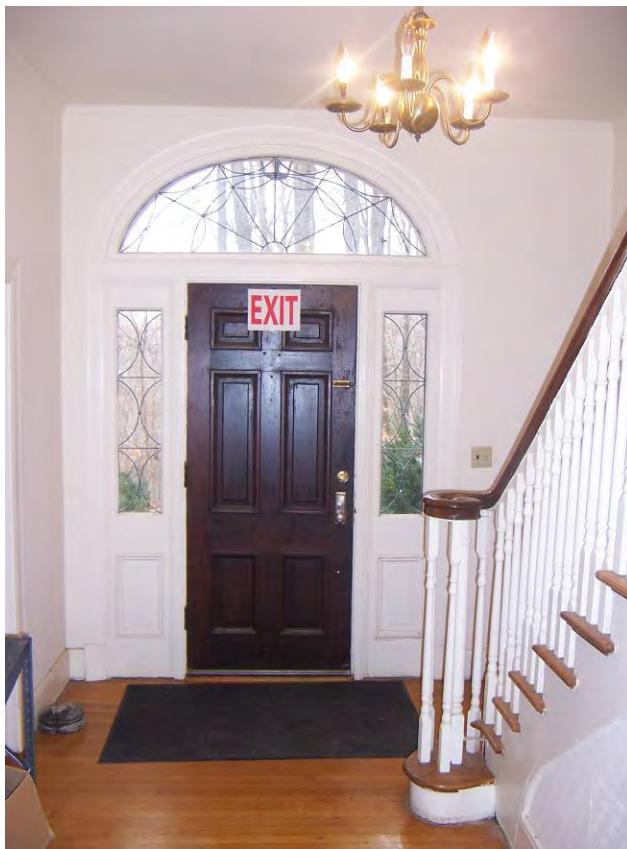


Figure 89. Inside of wood front door.



Figure 90. Interior wood trim.



Figure 91. Painted inside wood door.



Figure 92. Stained closet door in northeast bedroom.



Figure 93. Wood basement door.



Figure 94. Wood screen door.



Figure 95. Wood screen door and entrance door to hyphen.



Figure 96. Replacement wood door from screened porch to living room.



Figure 97. Wood screen door from screened porch to living room.



Figure 98. Wood screen door leading to screened porch.



Figure 99. Replacement garage doors.

**TREATMENT RATING 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE  
REPLACED IN-KIND.

**Statement of Importance:**

- The doors represent a substantial amount of historic fabric, and they contribute to the significance and historic appearance of the Childers House, and are an integral part of the building's historic construction.

**Condition:    *Good - Preserve***

Fair to good - Preserve

Poor - Replace

**INVENTORY QUANTITY AND CONDITION**

The wood doors are evaluated as Good when:

- All of the doors are GOOD or better.
- The door between the screened porch and living room is replaced with a historically sensitive door.
- The two garage doors are replaced with historically sensitive doors.

Minor deficiency of the wood doors exists where:

- The wood is scraped, primed, and repainted, including the endgrain, and/or
- any broken elements are repaired or replaced as necessary, and
- any repairs to the wood are made after cleaning the surface gently if necessary, and/or
- damaged wood is repaired and treated as per preservation standards, and/or
- doors are treated for mold growth, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to mold growth and paint and stain deterioration.

## **REPAIR OF BOWS OR UNDULATIONS IN A WOOD DOOR FRAME<sup>1</sup>**

U.S. General Services Administration  
Historic Preservation Technical Procedures

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08210-02

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### **PART 1---GENERAL**

#### **1.01 SUMMARY**

- A. This procedure includes guidance on realigning a bowed wood doorframe.
- B. A wood doorframe that bows or undulates may result from warping in the frame, building settlement, or pressure in the wall behind the frame.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

### **PART 2---PRODUCTS**

#### **2.01 MATERIAL**

- A. Wooden shims and blocking
- B. 6d and 8d finish nails

#### **2.02 EQUIPMENT**

- A. Wide blade putty knife and prybar
- B. Hack saw
- C. Hammer and chisel

### **PART 3---EXECUTION**

#### **3.01 EXAMINATION**

- A. To discern door problem, observe the door open and close a few times. Note the location of any binding or rubbing. Note also if door binds inconsistently from top to bottom or hinge side to latch side.

#### **3.02 ERECTION, INSTALLATION, APPLICATION**

- A. Check if jamb is secured to framing by carefully twisting and pushing it.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- B. Push back high spots where jamb is loose and secure by nailing. Use 8d finish nails for securing the jamb into the frame and 6d finish nails for securing the trim into the jamb.
- C. If jamb cannot be forced back into position, it must be freed from casing and re-aligned.
  1. Carefully loosen casing on less conspicuous side, with a wide blade putty knife and pry bar; insert putty knife blade first and then insert pry bar on top of knife blade, allowing the knife blade to protect the casing.
  2. Loosen casing on side that is more noticeable just enough to insert hacksaw and cut nails, which hold the casing to the jamb.
  3. Shim out low spots with solid wood wedges or blocking nailed into place through jamb. If necessary nails can be hidden by first removing door stops, nailing blocking into place and renailing stops.
  4. Cut down high spots by removing any existing shims and/or chiseling away at any blocking.
  5. When jamb is plumb and straight, resecure casing, filling nail holes as necessary.

END OF SECTION

## WOOD—WINDOWS (LEADED)

Basic window functions include admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. Windows are unique to the design of a building because they serve as both interior and exterior features.

Most of the windows of the Childers House are not historically significant as they are replacements but they do reflect the original design intent for the building. Historically significant windows are the sidelights and fanlight on the front elevation.



Figure 100. Aluminum covered wood sidelights and panels.



Figure 101. Closeup of aluminum covered wood sidelights and panels.



Figure 102. Interior wood trimmed sidelights and fanlight.



Figure 103. Closeup of interior of wood trimmed fanlight.



Figure 104. Closeup of interior of wood trimmed sidelight.

## TREATMENT RATING 1: PRESERVE

IF ANY WORK IS DONE ON THIS ELEMENT, IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

### **Statement of Importance:**

- The leaded glass windows are original in the design of the Childers House and have intrinsic historic value.

### **Condition:**    *Good-Preserve*

Fair to good - Preserve

Poor – Replace

## INVENTORY QUANTITY AND CONDITION

The leaded glass windows are evaluated as Good when:

- The leaded glass windows are structurally intact and performing their intended purpose, and
- the aluminum covering the original wood trim on the exterior is to be removed, and
- inside of the leaded glass windows and trim are cleaned in order to maintain the historic appearance.

Minor deficiency of the leaded glass windows exists where:

- Any repairs to the wood are made after cleaning the surface gently if necessary, and/or
- standard preventive maintenance practices and building conservation methods have not been followed.

## MAINTENANCE / MANAGEMENT GUIDELINES

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the leaded glass are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

## ***IDENTIFY, RETAIN, AND PRESERVE***

### ***Recommended***

- Identifying, retaining, and preserving windows--and their functional and decorative features--that are important in defining the overall historic character of the building.

- Such features can include frames, sash, muntins, glazing, sills, heads, hoodmolds, paneled or decorated jambs and moldings, and interior and exterior shutters and blinds.

#### *Not Recommended*

- Removing or radically changing windows that are important in defining the historic character of the building so that, as a result, the character is diminished.
- Changing the number, location, size, or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash that do not fit the historic window opening.
- Changing the historic appearance of windows using inappropriate designs, materials, finishes, or colors that noticeably change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame.
- Obscuring historic window trim with metal or other material.
- Stripping windows of historic material such as wood, cast iron, and bronze.
- Replacing windows solely because of peeling paint, broken glass, stuck sash, and high air infiltration. These conditions, in themselves, are no indication that windows are beyond repair.

### **PROTECT AND MAINTAIN**

#### *Recommended*

- Protecting and maintaining the wood and architectural metal that comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.
- Evaluating the overall condition of materials to determine whether more than protection and maintenance are required, i.e. if repairs to windows and window features will be required.

#### *Not Recommended*

- Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the window material is accelerated.
- Retrofitting or replacing windows rather than maintaining the sash, frame, and glazing.
- Failing to undertake adequate measures to assure the protection of historic windows.

### **REPAIR**

#### *Recommended*

- Repairing window frames and sash by patching, splicing, consolidating or otherwise reinforcing. Such repair may also include replacement in-kind--or with compatible substitute material--of those parts that are either extensively deteriorated or are missing when there are surviving prototypes such as architrave, hoodmolds, ash, sills, and interior or exterior shutters and blinds.

#### *Not Recommended*

- Replacing an entire window when repair of materials and limited replacement of deteriorated or missing parts are appropriate.
- Failing to reuse serviceable window hardware such as brass sash lifts and sash locks.
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the window or that is physically or chemically incompatible.

***REPLACE******Recommended***

- Replacing in-kind an entire window that is too deteriorated to repair using the same sash and pane configuration and other design details. If using the same kind of material is not technically or economically feasible when replacing windows deteriorated beyond repair, then a compatible substitute material may be considered.

***Not Recommended***

- Removing a character-defining window that is irreparable and blocking it in, or replacing it with a new window that does not convey the same visual appearance.

## REPAIRING EXISTING LEAD GLASS<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**08822-01**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### **PART 1---GENERAL**

#### **1.01 SUMMARY**

- A. This procedure includes guidance on repairing leaded glass, and includes information on repairing lead cames and structures, replacing deteriorated lead cames, and replacing deteriorated support structures.
- B. This work generally requires a specialist in stained and leaded glass repair.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the CRM.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.
- B. Restoration Program: Submit written program for each phase of restoration process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.
- C. Samples: Submit for verification purposes, prior to mock-up erection, samples of the following:
  1. Each type of replacement glass.
  2. Each type of lead came.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

### 1.03 QUALITY ASSURANCE

- A. Field Samples: Prior to start of leaded glass restoration work, prepare the following sample panels in building where directed by the CRM. Obtain the CRMS acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
  - 1. Cleaning: Demonstrate materials and methods to be used for cleaning on sample panel of approximately 9 sq. Ft. in area.
  - 2. Leaded Glass Repair: Prepare sample panel to demonstrate quality of materials and workmanship of each type of leaded glass indicated to be repaired and replaced.

### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Protect materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

## PART 2--PRODUCTS

### 2.01 MATERIALS

- A. Glass: Provide new glass to match opacity, color, thickness, texture, pattern and other aesthetic characteristics of existing glass.
- B. Lead Came: Provide new H and U-shape lead came to match size, profile and other aesthetic characteristics of existing lead came.
- C. Putty: Standard putty manufactured specifically for leaded glass work.
- D. Braces and Other Accessories: Provide new to match existing.
- E. Solder: 60% lead and 40% tin composition.
- F. Cleaner: Manufacturer's standard ammonia-base cleaning solution specifically designed for cleaning of leaded glass surfaces.
- G. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts and organic matter.
- H. Clean, soft cloths

### 2.02 EQUIPMENT

- A. Stiff bristle brush
- B. Vacuum

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Repairing Lead Cames and Structures:
  - 1. Soldering Joints: Solder new joints or resolder deteriorated or broken joints as follows:
    - a. Clean patina off lead by scraping surface of came with a sharp blade or file to expose shiny lead at least 1/8" either side of joint.
    - b. Apply flux to surface of came.
    - c. Apply solder to joint with a soldering iron.
    - d. Darken new solder by treating with tin oxide.

2. Replacing Lead Cames: Install new lead cames to replace damaged or deteriorated cames as follows:

- a. Carefully pry up all edges of came around pieces of glass that are seated in length of came to be replaced. Do not scratch or otherwise damage glass.
- b. Remove pieces of glass and cut out section of came to be replaced at joints.
- c. Install new strip of came and solder joints as described above.
- d. Pry up edges of new came and reinstall pieces of glass using a thin layer of putty in channels of cames to hold glass tightly in place.
- e. Press lead cames down to flat position and repair any broken or damaged solder joints.
- f. Darken new cames by treating with tin oxide.

3. Repairing Support Structures: Replace deteriorated support members or supplement existing support members as required as follows:

- a. Prior to repairing support structures, provide braces and temporary support as required to protect leaded glass work from deflection or other kind of damage.
- b. Carefully remove deteriorated support members.
- c. File or scrape old solder deposits from surfaces of lead came.
- d. Repair leaded glass as required to remove bowing or warping.
- e. Install new support members and solder and fasten to leaded glass.

B. Cleaning:

1. Clean all leaded glass surfaces.
2. Vacuum or brush loose dirt and dust from surfaces of glass.
3. Wash both sides of glass using a clean cloth and cleaner.
4. Rinse both surfaces thoroughly using a clean cloth and clean water to completely remove dirt and cleaner residue. Change rinse water frequently.
5. Repeat process as required to produce effect established by mock-up.
6. Wipe the surface with a dry clean cloth to prevent streaking.

### 3.02 ADJUSTING/CLEANING

- A. Protect leaded glass from damage during construction operation.
- B. At completion of project, remove any protective coverings and reclean any soiled surfaces using procedures and materials described herein.

END OF SECTION

## REPLACEMENT WINDOWS



Figure 105. Front facade with replacement windows.



Figure 106. Closeup of replacement window and metal covered lintel.



Figure 107. Closeup of aluminum covered window trim.



Figure 108. Closeup of replacement window and aluminum covered wood trim.



Figure 109. Closeup of replacement window set into original frame.



Figure 110. Replacement window.



Figure 111. Replacement basement window.



Figure 112. Interior of replacement basement window with exposed brick.



Figure 113. Interior of replacement basement window with exposed brick.

#### **TREATMENT RATING 6: SPECIFIED TREATMENT IS NOT REQUIRED**

IF ANY WORK IS DONE ON THIS ELEMENT, IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

##### **Statement of Importance:**

- The windows are not original in the design of the Childers House and have no historic value.

##### **Condition:**      *Good-Preserve*

Fair to good - Preserve

Poor – Replace

## HARDWARE

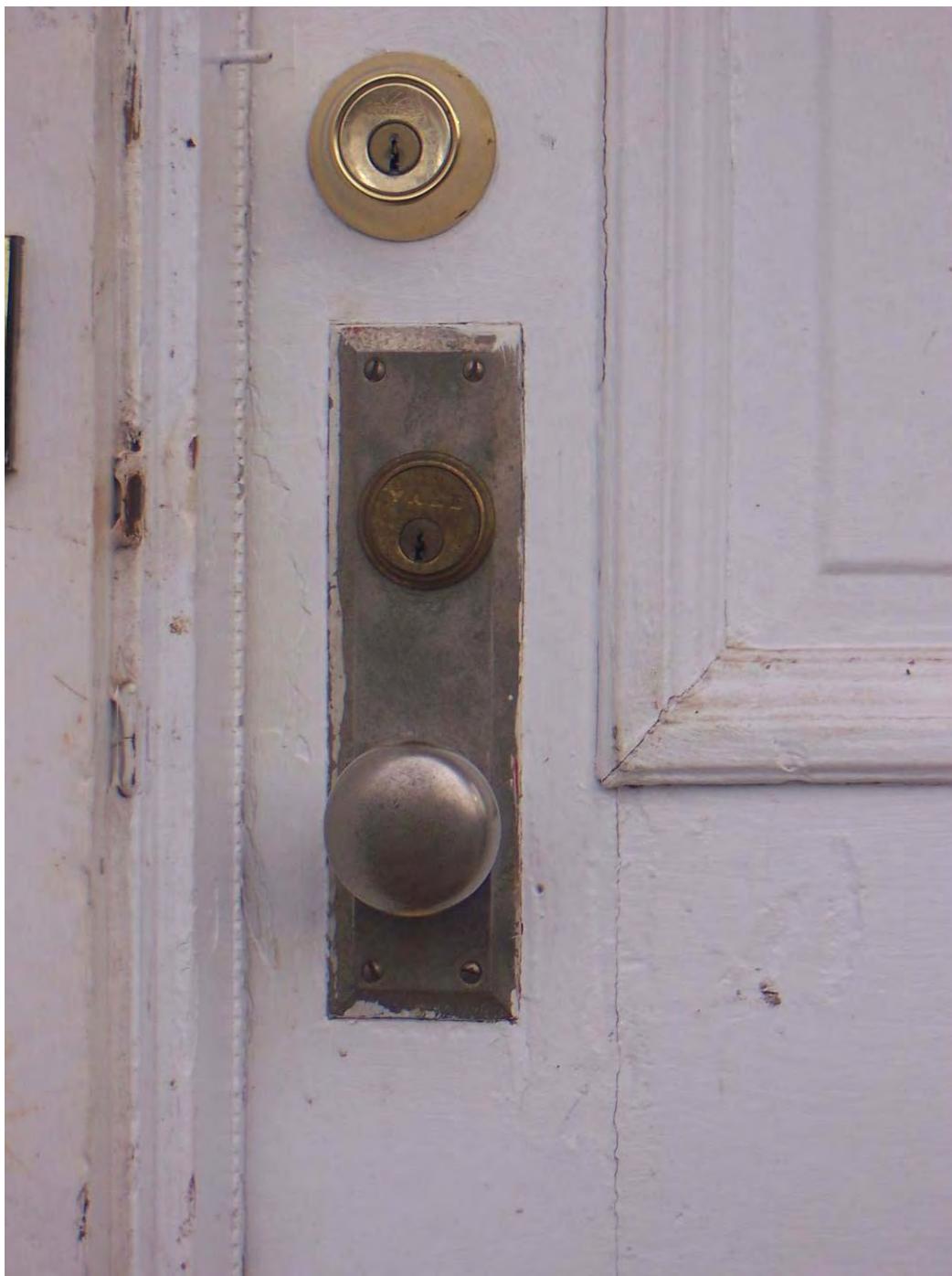


Figure 114. Original lockset with new deadbolt above on front door.



Figure 115. Original doorknob on front screen door.



Figure 116. Original doorknob on screen door between screened porch and living room.



Figure 117. Original handle on screen door to screened porch.

**TREATMENT RATING 2: PRESERVE WHEREVER POSSIBLE**

IF ANY WORK IS DONE ON THIS ELEMENT, IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

**Statement of Importance:**

- The hardware is original in the design of the Childers House.

**Condition:      *Fair – Preserve***

Fair to good - Preserve

Poor - Replace

**INVENTORY QUANTITY AND CONDITION**

The hardware is evaluated as Fair when:

- the hardware is rusting and will need to be cleaned, and
- the hardware on the doors is generally intact and operable, and
- the hardware shows signs of daily use and wear as the finishes are wearing, and
- the hardware needs to be maintained on a yearly basis in order to insure that it will continue to function properly.

Minor deficiency of the hardware exists where:

- rusty hinges and door hardware are cleaned, and/or
- hardware is maintained so that it remains in correct working condition.

## RAILING



Figure 118. Replacement railing on hyphen balcony.



Figure 119. Replacement railing on stairs.

## TREATMENT RATING 4: PRESERVE WHERE THERE IS NO COMPELLING REASON FOR REMOVAL

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

### **Statement of Importance:**

- The metal railings do not date to the period of significance of the building. They are a later, sensitive repair, but do not represent a substantial amount of historic fabric, are not distinctive, nor do they make any measurable contribution to the building's historic appearance or system of construction.

### **Condition:** *Good-Preserve*

Fair to good - Preserve

Poor – Replace

## INVENTORY QUANTITY AND CONDITION

The metal railings are evaluated as Good when:

- the railing on the south facade is rusting over 80% of its surface and the railing on the east facade is rusting over less than 5% of its surface, and/or
- the railings generally are in good condition and only need minor routine maintenance.

Minor deficiency of the metal railing exists where:

- railings should be cleaned and sealed to prevent further deterioration, and/or
- railings are replaced in-kind if they are beyond surface cleaning, and/or
- railings are maintained so that they remain in correct working condition, and/or
- standard preventive maintenance practices and building conservation methods have not been followed.

Minor deficiencies can include, but are not limited to: rusting surfaces.

## MAINTENANCE / MANAGEMENT GUIDELINES FOR METAL

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic metal are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

***IDENTIFY, RETAIN, AND PRESERVE******Recommended***

- Identifying, retaining, and preserving architectural metal features such as doorknobs, backplates, switchplates, and/or railings that are important in defining the overall historic character of the building; and their finishes and colors. Identification is also critical to differentiate between metals prior to work. Each metal has unique properties and thus requires different treatments.

***Not Recommended***

- Removing or radically changing architectural metal features, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Radically changing the type of finish or its historic color or accent scheme.

***PROTECT AND MAINTAIN******Recommended***

- Protecting and maintaining architectural metals from corrosion by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved, decorative features.
- Cleaning architectural metals, when appropriate, to remove corrosion prior to repainting or applying other appropriate protective coatings.
- Identifying the particular type of metal prior to any cleaning procedure and then testing to assure that the gentlest cleaning method possible is selected or determining that cleaning is inappropriate for the particular metal.
- Cleaning soft metals such as lead, tin, copper, terneplate, and zinc with appropriate chemical methods because their finishes can be easily abraded by blasting methods.
- Using the gentlest cleaning methods for cast iron, wrought iron, and steel--hard metals--in order to remove paint buildup and corrosion. If hand scraping and wire brushing have proven ineffective, low pressure grit blasting may be used as long as it does not abrade or damage the surface.
- Applying appropriate paint or other coating systems after cleaning in order to decrease the corrosion rate of metals or alloys.
- Repainting with colors that are appropriate to the historic building or district.
- Applying an appropriate protective coating, such as lacquer to an architectural metal feature subject to heavy pedestrian use, such as a bronze door.
- Evaluating the overall condition of the architectural metals to determine whether more than protection and maintenance are required, that is, if repairs to features will be necessary.

***Not Recommended***

- Failing to identify, evaluate, and treat the causes of corrosion, such as moisture from leaking roofs or gutters.
- Placing incompatible metals together without providing a reliable separation material. Such incompatibility can result in galvanic corrosion of the less noble metal, e.g., copper will corrode cast iron, steel, tin, and aluminum.
- Exposing metals, which were intended to be protected from the environment.
- Applying paint or other coatings to metals such as copper, bronze, or stainless steel that were meant to be exposed.

- Removing the patina of historic metal. The patina may be a protective coating on some metals, such as bronze or copper, as well as a significant historic finish.
- Cleaning soft metals such as lead, tin, copper, terneplate, and zinc with grit blasting which will abrade the surface of the metal.
- Using cleaning methods, which alter or damage the historic color, texture, and finish of the metal, or cleaning when it is inappropriate for the metal.
- Failing to employ gentler methods prior to abrasively cleaning cast iron, wrought iron, or steel; or using high pressure grit blasting.
- Failing to re-apply protective coating systems to metals or alloys that require them after cleaning so that accelerated corrosion occurs.
- Using new colors that are inappropriate to the historic building or district.
- Failing to assess pedestrian use or new access patterns so that architectural metal features are subject to damage by use or inappropriate maintenance such as salting adjacent sidewalks.
- Failing to undertake adequate measures to assure the protection of architectural metal features.

## ***REPAIR***

### ***Recommended***

- Repairing architectural metal features by patching, splicing, or otherwise reinforcing the metal following recognized preservation methods.
- Repairs may also include the limited replacement in-kind--or with a compatible substitute material--of those extensively deteriorated or missing parts of features when there are surviving prototypes such as porch balusters, column capitals or bases, or porch cresting.

### ***Not Recommended***

- Replacing an entire architectural metal feature such as a column or a balustrade when repair of the metal and limited replacement of deteriorated or missing parts are appropriate.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the architectural metal feature or that is physically or chemically incompatible.

## ***REPLACE***

### ***Recommended***

- Replacing in-kind an entire architectural metal feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature.
- Examples could include cast iron porch steps or steel sash windows.
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

### ***Not Recommended***

- Removing an architectural metal feature that is irreparable and not replacing it; or replacing it with a new architectural metal feature that does not convey the same visual appearance.

## PRIMERS AND PAINTS FOR WROUGHT IRON, CAST IRON, AND STEEL<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**05010-13**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

This standard includes general information on primers and paints to be used on interior and exterior wrought iron, cast iron, and steel surfaces.

THE SELECTION OF A SUITABLE PRIMER AND PAINT FOR METALS DEPENDS ON MANY FACTORS INCLUDING THE TYPE OF METAL TO BE COATED, THE TYPE OF SURFACE PREPARATION TO BE USED, ENVIRONMENTAL AND SURFACE CONDITIONS, DESIRED APPEARANCE, AND PERFORMANCE REQUIREMENTS, METHOD OF APPLICATION, AND TYPE AND LEVEL OF EXPOSURE. CONSULT A PAINT MANUFACTURER ALONG WITH THE DIRECTORATE OF ENVIRONMENTAL COMPLIANCE AND MANAGEMENT BEFORE MAKING THE FINAL SELECTION.

The primary purpose of paint is to protect the metal from deterioration. To do so, paint manufacturers have developed paint systems, which are made to work together to protect the metal substrate. These systems include primers and appropriate, compatible topcoats, which can vary depending on the substrate, environmental conditions, and can, vary between manufacturers. As a result, appropriate primers and compatible topcoats, both from the same manufacturer should be used.

For information on paint removal from metal, surface preparation, and application procedures see the following:

For guidance on paint removal from iron and steel, see:

- 05010-05-R "Cleaning/Removing Paint From Wrought Iron, Cast Iron and Steel Using Mechanical/Abrasive Methods"
- 05010-16-R "Removing Paint From Wrought Iron, Cast Iron and Steel Using Thermal Methods"
- 05010-17-R "Removing Paint From Wrought Iron, Cast Iron and Steel Using Chemical Methods"

For additional information on the history, properties and uses of paint, see 09900-01-S. See 09900-07-S for general guidelines on painting interior and exterior surfaces.

### PRIMERS FOR WROUGHT IRON, CAST IRON, AND STEEL

#### Characteristics

- Primary function is adhesion.
- Must bond well to substrate and intermediate coat. Should have enough chemical and weather resistance to protect the substrate before application of next coat.
- Should be compatible with intermediate and topcoats.
- Should be compatible with paint/rust removal methods.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

**Types****A. Oil/Alkyd Primers:****Advantages:**

1. Bond well to most surfaces even if surface preparation is substandard; and
2. Compatible with oil finish coats.

**Limitations:**

1. NOT compatible with finish coats of vinyl, epoxy or other synthetic polymer. Solvents in these systems attack and soften these primers; and
2. Limited corrosion resistance

**B. Mixed Resin Primers:****Advantages:**

1. Bond well to most surfaces, though adequate surface preparation is important; and
2. Compatible with most finish coats; and
3. Good alkali resistance; and
4. Some corrosion resistance.

**Limitations:**

1. It is only compatible with a specific range of topcoats.

**C. Resin Same as Topcoats:****Advantages:**

1. Effective when surface is properly prepared; and
2. Some corrosion resistance.

**D. Inorganic Zinc:****Advantages:**

1. Outstanding bonding characteristics when surface is cleaned and roughened; and
2. Compatible with most finish coats; and
3. Effectively resists disbanding; and
4. Excellent resistance to underfilm corrosion; and
5. Effective in protecting the metal without the help of a finish coat.

**Limitations:**

1. It is NOT acid or alkali-resistant.

**E. Wash Primers: Suitable for use on steel, aluminum, zinc, cadmium, chromium, tinplate, and terneplate.****Advantages:**

1. Provides a smooth, durable, uniform base for finish coat application; and
2. Compatible with the following topcoats: vinyl, phenolics, alkyds, nitrocellulose, and oil-type products.

**Limitations:**

1. It is NOT recommended for surfaces subject to temperatures above 150 degrees F (66 degrees C).

**F. Conversion Coatings: Oxidizing solution Used on zinc, iron, aluminum, and magnesium (formulation will vary depending on type of metal). This type of coating is usually factory-applied.****Advantages:**

1. Excellent corrosion resistance; and
2. Good adhesion to subsequent paint coats.

**Limitations:**

1. It is subject to deterioration if overheated.

**G. Zinc Chromate:** Used on aluminum, magnesium, and ferrous metals.**Advantages:**

1. It has good corrosion resistance.

**Limitations:**

1. It is not suited to highly acidic environments.

**H. Zinc-rich Coatings:****Advantages:**

1. It has good corrosion resistance.

**PAINTS FOR WROUGHT IRON, CAST IRON, AND STEEL****Characteristics**

Should be compatible with primer

- Intermediate coat should uniformly bond the primer with the topcoat.
- Intermediate coat should have enough chemical and weather resistance to protect the primer and substrate.

**Types****A. Oil-based/Aldkyd Enamel:****Advantages:**

1. For normal to severe weather conditions, provides good abrasion and dirt resistance; and
2. Suitable for both exterior and interior uses; and
3. Good bonding characteristics.

**Limitations:**

1. Alkyds are not good in a continuously damp or chemically corrosive environment, nor are they solvent resistant; and
2. Limited alkali resistance.

**B. Baked Phenolic:****Advantages:**

1. Excellent resistance to acidic environments; and
2. Excellent resistance to water; and
3. Excellent resistance to strong solvents; and
4. Low material cost.

**Limitations:**

1. Low alkali resistance; and
2. High labor cost for application.

**C. Epoxies:****Advantages:**

1. Good adhesion, and
2. Good chemical resistance, and
3. Good abrasion resistance, and
4. Good alkali resistance.

**Limitations:**

1. Sensitive to chalking under exterior exposure, and
2. Sensitive to color fading, and
3. Weak in acid.

D. Acrylics: (thermoplastic and thermosetting coatings)

Advantages:

1. Moderate cost; and
2. Good resistance to degradation from ultraviolet light; and
3. Suitable for both interior and exterior use.

E. Vinyl: Used primarily as intermediate coats

Advantages:

1. Good alkali and acid resistance, and
2. Excellent water resistance, and
3. Low chalking rate.

Limitations:

1. Limited solvent and heat resistance, and
2. Inferior to alkyd and epoxy coatings - lower adhesive strength, and
3. Sensitive to intercoat contamination.

F. Inorganic Zinc:

Advantages:

1. Excellent weather and solvent resistance, and
2. Excellent resistance to underfilm corrosion, and
3. Resistant to petroleum products.

Limitations:

1. Limited chemical resistance, and
2. Not suitable for strong acid or strong alkali environments.

G. Organic Zinc:

Advantages:

1. It protects against corrosion.

H. Furan:

Advantages:

1. It is one of the most versatile and resistant of organic films.

Limitations:

1. Poor adhesion to steel and any primed surface; and
2. The film gets very hard after curing, making it extremely difficult to maintain them.

I. Urethanes:

Advantages:

1. Excellent gloss and color retention; and
2. Preferable to epoxy protective coatings or primers; and
3. Available in a wide variety of formulations for different surface types and conditions.

Limitations:

1. Comparable to epoxies and vinyl in resistance to corrosion; and
2. Some tend to yellow when exposed to sunlight; and
3. It is expensive.

J. Silicones:

Advantages:

1. Excellent heat resistance; and
2. Excellent color and gloss retention; and
3. Available in pure or modified form (a mixture of 2 coating types).

Limitations:

1. It is expensive.

END OF SECTION

## METAL—CLAD ARCHITECTURAL ELEMENTS



Figure 120. Metal covered decorative wood elements.



Figure 121. Metal covered decorative wood elements on front stoop.



Figure 122. Metal covered front stoop post.



Figure 123. Metal covered wood panel.



Figure 124. Metal covered decorative wood elements.



Figure 125. Metal covered decorative wood elements on dormer.



Figure 126. Metal covered decorative wood elements on screened porch.



Figure 127. Metal covered decorative wood elements on screened porch.



Figure 128. Original wood elements on inside of screened porch.

## TREATMENT RATING 5: REMOVE/ALTER/REPLACE

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

### Statement of Importance:

- The metal clad architectural elements detracts from the historic appearance of the building, and
- supplies a mechanism for the deterioration of the original wood elements beneath it, and
- does not contribute to the significance of the Childers House.

### Condition: *Fair– Replace*

Fair to good - Replace

Poor - Replace

## INVENTORY QUANTITY AND CONDITION

The metal clad architectural elements are evaluated as Fair when:

- the metal clad architectural elements are materially intact; however, it shows signs of corrosion and localized paint failure, and
- the current condition of the metal clad architectural elements is due to improper maintenance, and
- the metal clad architectural elements are removed to reveal the original wood elements beneath, thus the metal clad architectural elements require no repair.

Minor deficiency of the siding exists where:

- The metal clad architectural elements are undergoing corrosion where paint has delaminated, and
- the metal clad architectural elements are removed to reveal the original wood architectural elements beneath, and
- the wood elements beneath are scraped, cleaned, primed and repainted as laid out in the wood chapter of this manual, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems because of the element's deficiency.

## METAL—GUTTERS AND DOWNSPOUTS



Figure 129. Downspout and plastic pipe not connected.



Figure 130. Gutter leading water towards building.



Figure 131. Gutter not cleaned out.



Figure 132. Dormer gutters leading towards roof and not cleaned out.

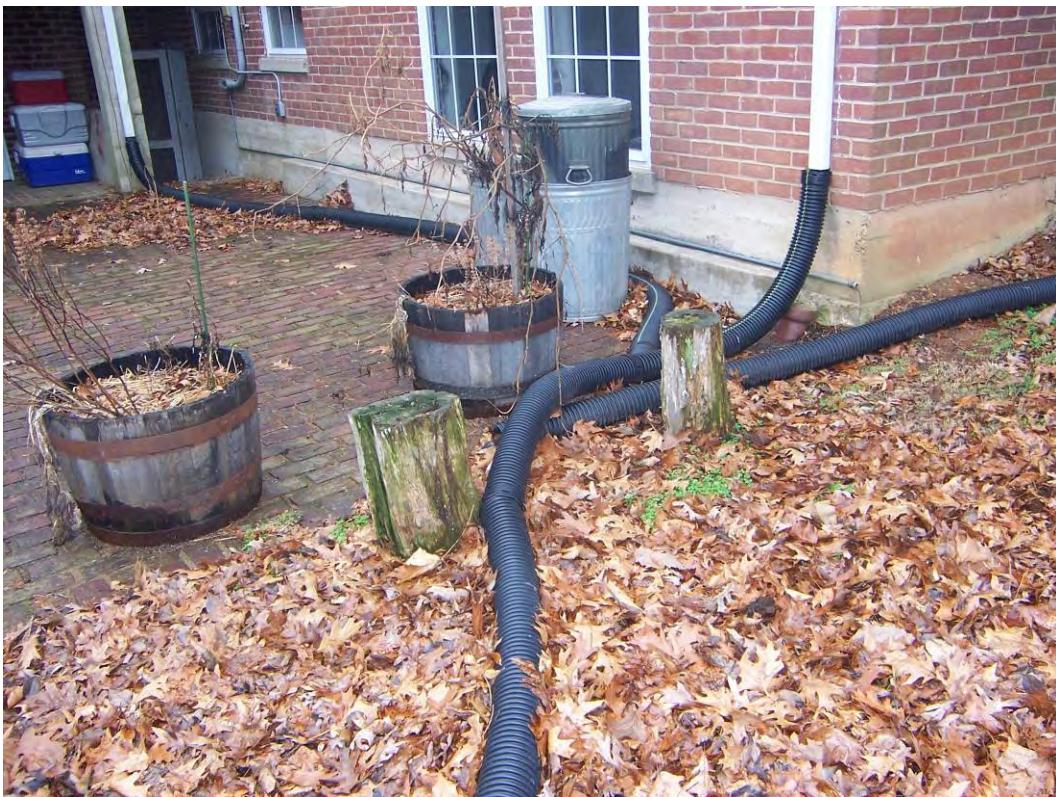


Figure 133. Plastic pipes snaking across patio.



Figure 134. Plastic pipe that ends before gutter.



Figure 135. Unnecessary gutter.



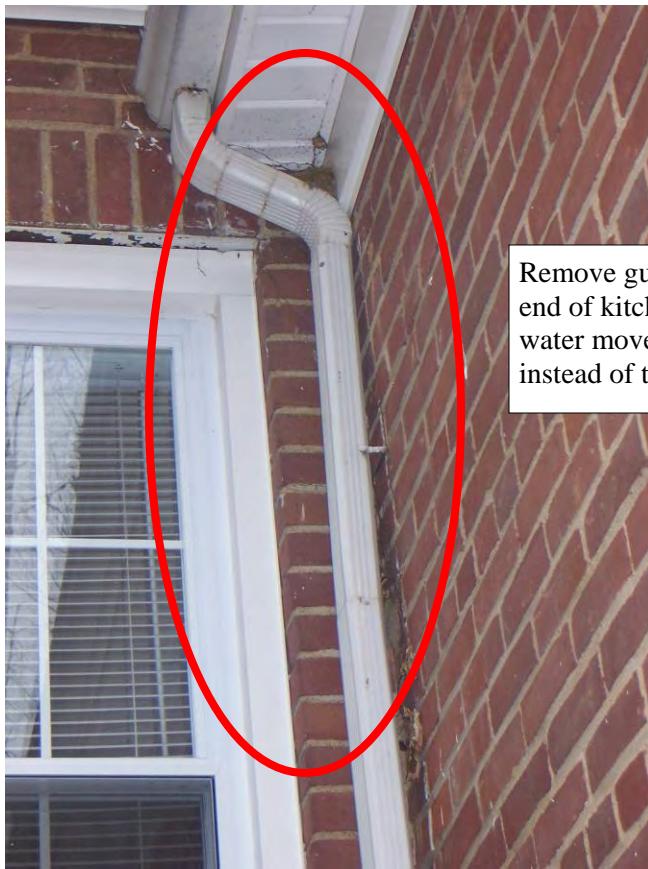
Figure 136. Leaking connection between downspout and plastic pipe.



Figure 137. Downspout that does not lead to anything.



Figure 138. Leaking gutter (above) that is dripping on plastic pipe and splashing brick.



Remove gutter and move to other end of kitchen addition so that rain-water moves away from this corner instead of towards it.

Figure 139. Gutter that leads water towards building.



Figure 140. Salt staining on brick from gutter overflow.



Figure 141. Gutter not cleaned out on kitchen addition.



Figure 142. Gutter seal broken between two sections.



Figure 143. Gutter on kitchen addition that leads towards house.

### **TREATMENT RATING 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

#### **Statement of Importance:**

- The metal gutters do not date to the period of significance of the building. They are a later, sensitive repair, but do not represent a substantial amount of historic fabric, are not distinctive, nor do they make any measurable contribution to the building's historic appearance or system of construction.

#### **Condition: Poor– Replace**

Fair to good - Preserve

Poor – Replace

#### **INVENTORY QUANTITY AND CONDITION**

The metal gutter and downspout elements are evaluated as Poor when:

- they lead water towards the building, and/or
- plastic pipes are utilized to move water around the roof, and/or
- plastic pipes are utilized to move water away from the building, and/or
- the gutters and downspouts are not connected to each other.

It is the recommendation of this manual that ALL gutters, downspouts, and plastic piping be removed from the Childers House. Seamless gutters with leaf guards need to be installed on the house so that all water is moved away from the structure. The original downspouts drained into terra cotta piping. It is the recommendation that this terra cotta piping system be rejuvenated so that the use of plastic piping is not necessary. See the above figures for specific problem areas.

## ELECTRICAL



Figure 144. Non-original light fixture on front stoop.



Figure 145. Non-original light fixture on screened porch.



Figure 146. Non-original light fixture on hyphen balcony.

#### **TREATMENT RATING 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

##### **Statement of Importance:**

- The light fixtures do not date to the period of significance of the building. They are a later addition and do not represent a substantial amount of historic fabric, are not distinctive, nor do they make any measurable contribution to the building's historic appearance or system of construction.

##### **Condition:**    *Poor– Replace*

Fair to good - Preserve

Poor – Replace

#### **INVENTORY QUANTITY AND CONDITION**

Replace these three light fixtures with historically accurate light fixtures.

**INTERIOR WOOD--STAIR HANDRAIL AND BALUSTRADE**

Figure 147. Stair handrail and balustrade.

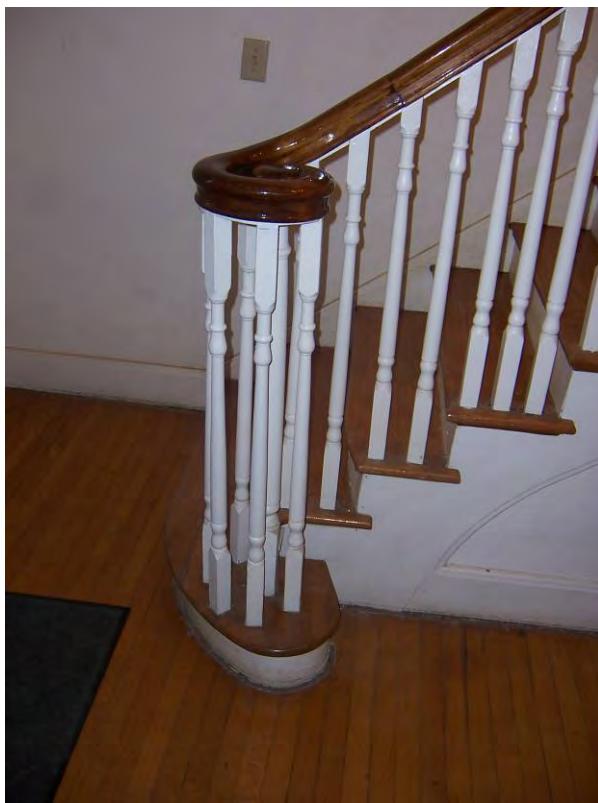


Figure 148. Stair newel post and balustrade.

**TREATMENT RATING 1: PRESERVE.****Statement of Importance:**

- The entire stairway in the entrance is associated with those qualities for which the Childers House was designated a historic property, and
- the entire stairway contributes to the significance and historic appearance of the Childers House, and
- the entire stairway is architecturally distinctive and has a high level of historic integrity.

**Condition:     *Good – Preserve***

Fair to good - Preserve

Poor - Preserve

**INVENTORY QUANTITY AND CONDITION**

The stairway is evaluated as Good when:

- the entire stairway is intact and in excellent condition, and
- any repair or maintenance of the stairway is to be executed by a qualified professional.

**MAINTENANCE / MANAGEMENT GUIDELINES FOR ALL STAIR HANDRAIL AND BALUSTRADE**

See interior wood preventative maintenance/management guidelines after Millwork and Wood Floors section.

## INTERIOR WOOD--FIREPLACE MANTELS



Figure 149. Living room fireplace mantel.



Figure 150. Closeup of living room fireplace mantel.

**TREATMENT RATING 1: PRESERVE.****Statement of Importance:**

- Both the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom are associated with those qualities for which the Childers House was designated a historic property, and
- Both the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom contribute to the significance and historic appearance of the Childers House, and
- Both the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom are artistically distinctive and have a high level of historic integrity.

**Condition:      *Good – Preserve***

Fair to good - Preserve

Poor - Preserve

**INVENTORY QUANTITY AND CONDITION**

The fireplace mantel in the living room and the fireplace mantel in the second floor bedroom are evaluated as Good when:

- Both the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom are intact and in good condition, and
- cleaning and repair of the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom will result only from professional recommendation, and
- any repair or maintenance of the fireplace mantel in the living room and the fireplace mantel in the second floor bedroom is to be executed by a qualified professional.

**MAINTENANCE / MANAGEMENT GUIDELINES FOR THE FIREPLACE  
MANTELS**

See interior wood preventative maintenance/management guidelines after Millwork and Wood Floors section.

## INTERIOR WOOD-CABINETRY

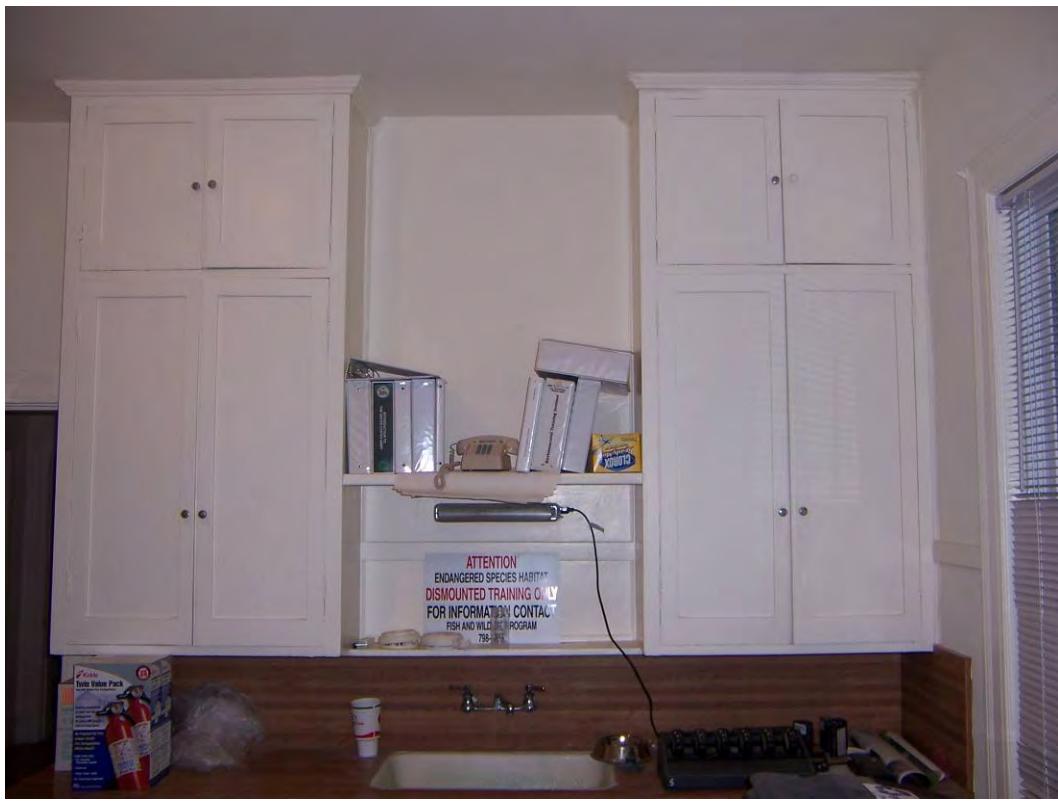


Figure 151. Upper cabinets in original kitchen.

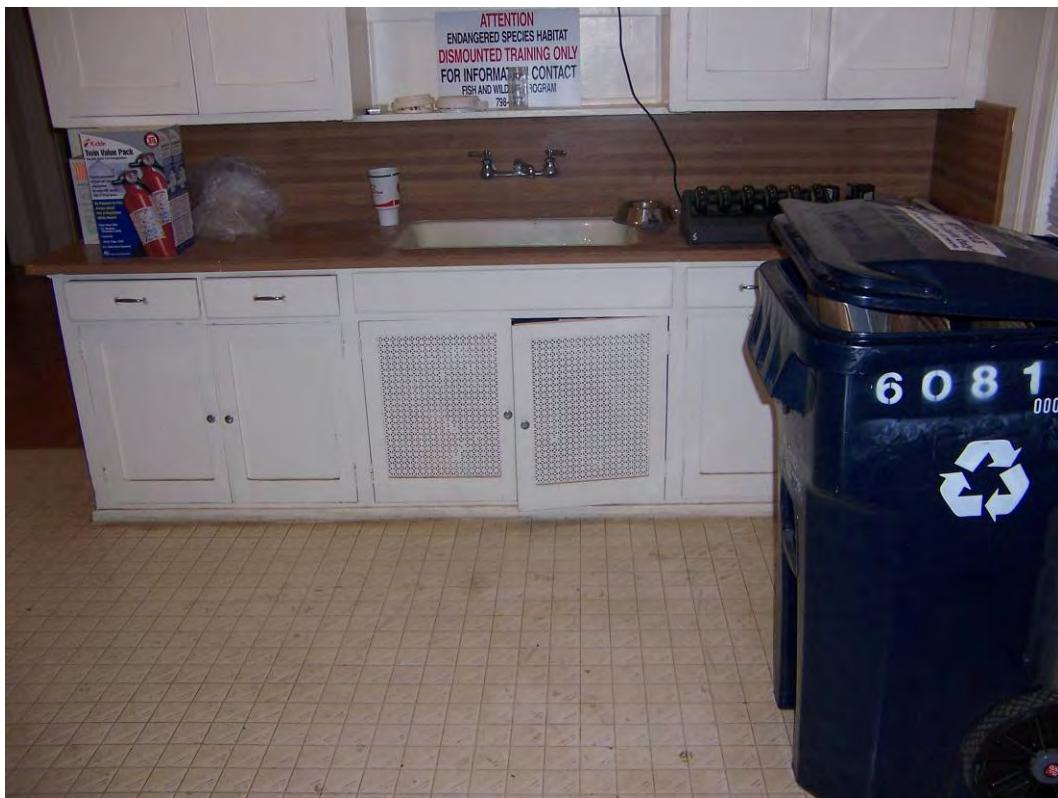


Figure 152. Lower cabinets in original kitchen.



Figure 153. Cabinets in hyphen.



Figure 154. Detail of column on cabinets in hyphen.

**TREATMENT RATING 1: PRESERVE.****Statement of Importance:**

- The cabinetry is associated with those qualities for which the Childers House was designated a historic property, and
- the cabinetry contributes to the significance and historic appearance of the Childers House, and
- the cabinetry is architecturally distinctive and has a high level of historic integrity.

**Condition:**    *Good – Preserve*

Fair to good - Preserve

Poor - Preserve

**INVENTORY QUANTITY AND CONDITION**

The cabinetry is evaluated as Good when:

- the cabinetry is intact and in good condition, and
- cleaning and repair of the cabinetry will result only from professional recommendation, and
- any repair or maintenance of the cabinetry is to be executed by a qualified professional.

**MAINTENANCE / MANAGEMENT GUIDELINES FOR CABINETRY**

See interior wood preventative maintenance/management guidelines after Millwork and Wood Floors section.

## MILLWORK AND WOOD FLOORS



Figure 155. Millwork around door from front hallway to living room.



Figure 156. Millwork and floor in front hallway.



Figure 157. Millwork and floor in living room.

### TREATMENT RATING 1: PRESERVE.

#### Statement of Importance:

- The millwork and flooring are associated with those qualities for which the Childers House was designated a historic property, and
- the millwork and flooring contributes to the significance and historic appearance of the Childers House, and
- the millwork is architecturally distinctive and has a high level of historic integrity, and
- the flooring, although not distinctive, has a high level of historic integrity.

#### Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Preserve

### INVENTORY QUANTITY AND CONDITION

The millwork and flooring is evaluated as Good when:

- the millwork and flooring are intact and in good condition, and
- cleaning and repair of the millwork and flooring will result only from professional recommendation, and
- any repair or maintenance of the millwork and flooring is to be executed by a qualified professional.

## **MAINTENANCE / MANAGEMENT GUIDELINES FOR ALL INTERIOR WOOD**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic interior wood are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

### **IDENTIFY, RETAIN, AND PRESERVE**

#### *Recommended*

- Identifying, retaining, and preserving architectural historic interior wood features such as baseboards, door millwork, window millwork, mantels, floors, cabinetry, and stairs, and/or railings that are important in defining the overall historic character of the building; and their finishes and colors. Identification is also critical to differentiate between hardwoods and softwoods prior to work. Each type of wood has unique properties and thus requires different treatments.

#### *Not Recommended*

- Removing or radically changing architectural historic interior wood, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Radically changing the type of finish or its historic color or accent scheme.

### **PROTECT AND MAINTAIN**

#### *Recommended*

- Remove damaged or deteriorated paint only to the next sound layer using the gentlest means possible (handscraper, wire brush, or sand paper), then repaint. Stripping methods including hot air guns, heat plates, and chemical or dip stripping should be employed with great care, and only as a supplement to handscraping, brushing and sanding.
- Apply specification-approved primer and paint following proper surface preparation and product instructions.
- Inspect regularly for wood that is excessively or continually moist and for evidence of insect infestation and fungal rot.
- Address evidence of moisture infiltration and infestation as soon as possible.
- Use only hot-dipped, zinc-coated nails, bolts, and hardware for use on treated wood.
- Countersink and putty all new, exposed nails and screws according to general specifications.

#### *Not Recommended*

- Replacing, rebuilding, or altering any original wood features that could be preserved or consolidated.

- Introducing new or non-specific brands of paint, colors or methods of application.
- Failing to identify, evaluate, and treat the causes of wood deterioration, including insect or fungus infestation.
- Using chemical preservatives (such as creosote) which can change the appearance of wood features.
- Using destructive paint removal methods such as propane or butane torches, sandblasting, or waterblasting. These methods can irreversibly damage historic woodwork.
- Using thermal devices improperly when removing paint so that historic woodwork is scorched or damaged.
- Failing to neutralize wood thoroughly after using chemicals so the new paint does not adhere.
- Allowing detachable wood features, like doors, to soak too long in a caustic solution so that the wood grain is raised and the surface roughened.

## ***REPAIR***

### ***Recommended***

- Fill moderate-sized holes and check cracks with putty or epoxy filler. Repair should be applied as per general specifications.
- Repair fragile original wood using well-tested consolidants when appropriate. Repairs should be physically, visually, and chemically compatible and identifiable upon close inspection

### ***Not Recommended***

- Removing or replacing original wood that could be stabilized and conserved, or repaired with limited replacement of deteriorated or missing parts.
- Using substitute materials that are physically, visually, or chemically incompatible with the original materials.

## ***REPLACE***

### ***Recommended***

- Replace deteriorated or damaged wood by carefully patching, piecing-in, or otherwise reinforcing the wood using recognized preservation methods. Replacement work should be permanently dated in an unobtrusive location.

### ***Not Recommended***

- Removing an original wood feature that is repairable. Removing an original wood feature that is unrepairable and not replacing it, or failing to label the new work.

## **BIENNIAL CLEANING AND STAIN REMOVAL OF WOODWORK<sup>1</sup>**

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**06400-02**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### **PART 1---GENERAL**

#### **1.01 SUMMARY**

- A. This procedure includes guidance on the routine dusting and cleaning of wood surfaces.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Quality Assurance
  - 4. Delivery, Storage and Handling
  - 5. Project/Site Conditions
  - 6. Sequencing and Scheduling
  - 7. General Protection (Surface and Surrounding)

#### **1.02 SUBMITTALS**

- A. Samples: Submit sample of stain and wood filler for approval of the CRM.

### **PART 2---PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Butcher Polish Company  
120 Bartlett Street  
Marlborough, MA  
617/481-5700

#### **2.02 MATERIALS**

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances, however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (\*).

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- A. Solvent: Mineral spirits, turpentine or denatured alcohol.

Mineral Spirits:

- 1. A petroleum distillate that is used especially as a paint or varnish thinner.
- 2. Other chemical or common names include Benzine\* (not Benzene); Naphtha\*; Petroleum spirits\*; Solvent naphtha\*.
- 3. Potential Hazards: TOXIC AND FLAMMABLE.
- 4. Safety Precautions:
  - a. AVOID REPEATED OR PROLONGED SKIN CONTACT.
  - b. ALWAYS wear rubber gloves when handling mineral spirits.
  - c. If any chemical is splashed onto the skin, wash immediately with soap and water.
- 5. Available from construction specialties distributor, hardware store, paint store, or printer's supply distributor.

Turpentine:

- 1. Typically used as a solvent and thinner.
- 2. Potential Hazards: TOXIC AND FLAMMABLE.
- 3. Safety Precautions:
  - a. Work in a well ventilated area.
  - b. Observe safety rules as turpentine is flammable, and the fumes can trip an ionization smoke detection system.
  - c. Store soiled cloths in a metal safety container to guard against spontaneous combustion.
  - d. Available from hardware store or paint store.

Denatured Alcohol:

- 1. Other chemical or common names include Methylated spirit\*.
- 2. Potential hazards: TOXIC AND FLAMMABLE.
- 3. Available from hardware store, paint store or printer's supply distributor.
- 4. Denatured alcohol should be a satisfactory substitute for ethyl alcohol for stain removing purposes.

- B. Cloth: Clean cotton rags

- C. Sand paper: 3 grades, finest grade 00

- D. Wax: Butcher's wax, such as "Butcher's paste Wax (Butcher Polish Company)

- E. Bleach: Standard household bleach

- 1. An unstable salt produced usually in aqueous solution and used as a bleaching and disinfecting agent.
- 2. Other chemical or common names include Bleaching solution\*; Household bleach\*; Laundry bleach\*; Sodium Hypochlorite; Solution of chlorinated soda\*.
- 3. Potential Hazards: CORROSIVE TO FLESH.

4. Available from chemical supply house, grocery store or supermarket, hardware store or janitorial supply distributor.
- F. Oil Stain and Thinner: To achieve a match between stained areas and original wood finish.
- G. Shellac burn-in sticks
- H. Clean, potable water

### PART 3---EXECUTION

#### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Dust with a solvent-treated soft cloth.
- B. Dry rub with a soft cloth to maintain the polish, rubbing along the grain of the wood.
- C. Stain and Spot Removal: Stains may be cleaned by promptly wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth. White spots may be removed by rubbing them with a small amount of linseed oil.
- D. Old Stain Removal: If water and solvent fail to remove dark stains, brush full-strength bleach onto stained area and allow to stand one minute. Use clean, cotton rags to keep the bleach from running. **TEST BLEACH IN A SMALL INCONSPICUOUS AREA PRIOR TO USING THE BLEACH ON THE LARGE STAIN TO ENSURE THAT IT WILL NOT DAMAGE THE WOOD.**
  1. Rinse bleach completely from wood.
  2. If area is too light in color, carefully apply a small amount of stain to match original wood finish.
  3. Lightly sand area and apply wax following manufacturer's instructions using clean cotton rags, rubbing in direction of wood grain.
- E. Biennial Cleaning:
  1. Damp-wipe woodwork with a soft cloth dampened in clear water.
  2. Promptly dry the wood with a soft cloth, rubbing along the grain.
  3. Polish by dry rubbing with a soft cloth.
- F. Fill scratches and gouges with shellac burn-in sticks matching color to the wood stain.
- G. Apply wax following manufacturer's instructions using clean cotton rags, rubbing in direction of wood grain.
- H. See also 06400-01-P and 06400-01-R for guidance on the general cleaning of wood surfaces.

END OF SECTION

# PATCHING CRACKS AND HOLES IN WOODWORK<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**06400-16**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### **1.01 SUMMARY**

- A. This procedure includes guidance on patching cracks and small holes in woodwork.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

### **1.02 REFERENCES**

- A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Quality Standards, Premium Grade, published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

### **1.03 SYSTEM DESCRIPTION**

- A. Performance Requirements: Submit written program for each phase of restoration process including protection of surrounding materials on building during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.

### **1.04 QUALITY ASSURANCE**

- A. Mock-Ups: Prior to start of wood restoration work, prepare the following sample panels in building where directed by the CRM. Obtain CRM acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
- 1. Wood Repair: Prepare sample panels for each type of woodwork indicated to be patched, resurfaced, modified or replaced. Prepare mock-up panels on existing woodwork to demonstrate quality of materials and workmanship.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## 1.05 PROJECT/SITE CONDITIONS

### A. Existing Conditions:

1. Installer shall advise Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.
3. Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.

## PART 2---PRODUCTS

### 2.01 MATERIALS

#### A. Patching Materials:

1. Wood Filler: Standard filler manufactured specifically for restorative patching of woodwork.
    - a. Tint filler to match existing woodwork.
  2. Sandpaper: No. 3/0 or No. 5/0 garnet paper.
- B. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of existing woodwork.

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Remove all minor surface imperfections such as scratches, dents, etc., by rubbing surface with a fine grit sandpaper.
- B. Patch all holes and cracks in woodwork up to 1/2" across with wood filler tinted to match existing wood.
- C. Carefully hand rub filled area with a fine grit sandpaper to match surface characteristics of adjacent woodwork.
- D. Touch-up patch during finishing so that color and other appearance characteristics of filled area match the finish of adjacent woodwork. See 06400-05-R, 06400-06-R, and 06400-10-R for guidance on refinishing.
- E. Patch holes and cracks in woodwork 1/2" and greater across and woodwork damaged from hardware changes with wood plugs or wood patches.
- F. Rout out hole or crack woodwork to receive plus or patch materials. Veneer-type patches shall match the existing thickness of the veneer.
- G. All repair plugs and patches in wood with a transparent finish shall have grain aligned.

### 3.02 ADJUSTING/CLEANING

- A. Upon completion of this work, all floors, walls, and other adjacent surfaces that are stained, marred, or otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.

- B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the CRM.
- C. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- D. Clean woodwork: Dust and damp wipe woodwork with a soft cloth dampened in clean water; dry rub with soft cloth to maintain the polish, rubbing along the grain of the wood.
- E. Stain and Spot Removal:
  - 1. Stains may be cleaned by prompt damp wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth.
  - 2. White spots may be removed by rubbing them with a small amount of linseed oil.

END OF SECTION

# REPAIRING WATER-DAMAGED WOODWORK<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**06400-11**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on repairing woodwork stained from minor water damage.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

## PART 2---PRODUCTS

### 2.01 MATERIALS

- A. Wood stain
- B. Wood bleach: Solution of sodium perborate, hydrogen peroxide or proprietary mixture suitable for oak.
- C. Wood filler, colored to match wood
- D. Sandpaper: Extra fine grit
- E. Mild cleaner such as "Murphy's Oil Soap"

## PART 3---EXECUTION

### 3.01 PREPARATION

- A. Surface Preparation:
  1. Mask all adjacent surfaces and protect other exposed surfaces in the work area.
  2. Fill any splits in existing wood and sand smooth prior to sealer application.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Select an inconspicuous area on which to test materials and application for each method type required. Test area must be approved by the Contracting Officer.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- B. After each test area has been prepared, receive approval from the Contracting Officer before commencing general application.
- C. Check area with a moisture meter to verify that wood does not have moisture on surface.
- D. Sand stained areas to bare wood.
- E. If bare wood is stained, apply wood bleach to remove stain. Minimize flow of bleach onto areas not stained. Allow to dry and sand wood lightly to remove chemical residue.
- F. Fill wood if required and apply stain of color to match existing.

### 3.03 ADJUSTING/CLEANING

- A. Wash woodwork with mild detergent and water.
- B. Dry immediately with clean cloth.
- C. Finish to match historic finish.

END OF SECTION

# REPLACING DETERIORATED WOODWORK<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**06400-15**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on wood restoration work including repairing existing woodwork by removing damaged or deteriorated material and replacing with new to match existing.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

### 1.02 REFERENCES

- A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Quality Standards, Premium Grade, published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

### 1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Submit written program for each phase of restoration process including protection of surrounding materials on building during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.

### 1.04 QUALITY ASSURANCE

- A. Mock-Ups: Prior to start of wood restoration work, prepare the following sample panels in building where directed by the CRM. Obtain CRM acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
  1. Wood Repair: Prepare sample panels for each type of woodwork indicated to be patched, resurfaced, modified or replaced. Prepare mock-up panels on existing woodwork to demonstrate quality of materials and workmanship.

### 1.05 PROJECT/SITE CONDITIONS

- A. Existing Conditions:
  1. Installer shall advise Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

temperature and relative humidity have been stabilized and will be maintained in installation areas.

2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.
3. Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.

## PART 2---PRODUCTS

### 2.01 MATERIALS

#### A. New or Replacement Materials:

1. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content range of 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed the above range.
  3. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of existing woodwork.
- B. Clean, soft cloths

## PART 3---EXECUTION

### 3.01 PREPARATION

#### A. Surface Preparation:

1. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
2. Back prime woodwork on all surfaces which will be concealed with one coat of wood primer. Schedule delivery to allow time for application and drying of Back prime coat before installation of woodwork.
3. Remove miscellaneous hardware, nails, etc., from all existing woodwork as required to provide a first class installation of new or replacement woodwork.
4. Prior to installation of new architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Carefully remove at locations indicated any damaged or deteriorated woodwork. Unless indicated otherwise, replace the entire length of the existing damaged piece to the next butt joint.
- B. For partial replacement of existing pieces, use a neat, well-fitted level cut with grain aligned in transparent finished wood.
- C. Install new pieces as described below:
  1. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims.
  2. Cut to fit unless specified to be shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.
  3. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.
  4. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk,

concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with wood-work, and matching final finish where transparent finish is indicated.

- D. Finish replacement woodwork to match adjacent woodwork surfaces. See 06400-05-R and 06400-10-R for guidance.

### 3.03 ADJUSTING/CLEANING

- A. Upon completion of this work, all floors, walls, and other adjacent surfaces that are stained, marred, or otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.
- B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the CRM.
- C. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace wood-work. Adjust joinery for uniform appearance.
- D. Clean woodwork: Dust and damp wipe woodwork with a soft cloth dampened in clean water; dry rub with soft cloth to maintain the polish, rubbing along the grain of the wood.
- E. Stain and Spot Removal:
  1. Stains may be cleaned by prompt damp wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth.
  2. White spots may be removed by rubbing them with a small amount of linseed oil.

### END OF SECTION

## BATHROOM FIXTURES



Figure 158. Original sink and tile in first floor bathroom.



Figure 159. Original bathtub in first floor bathroom.



Figure 160. Original medicine chest in first floor bathroom.



Figure 161. Original tile floor in first floor bathroom.

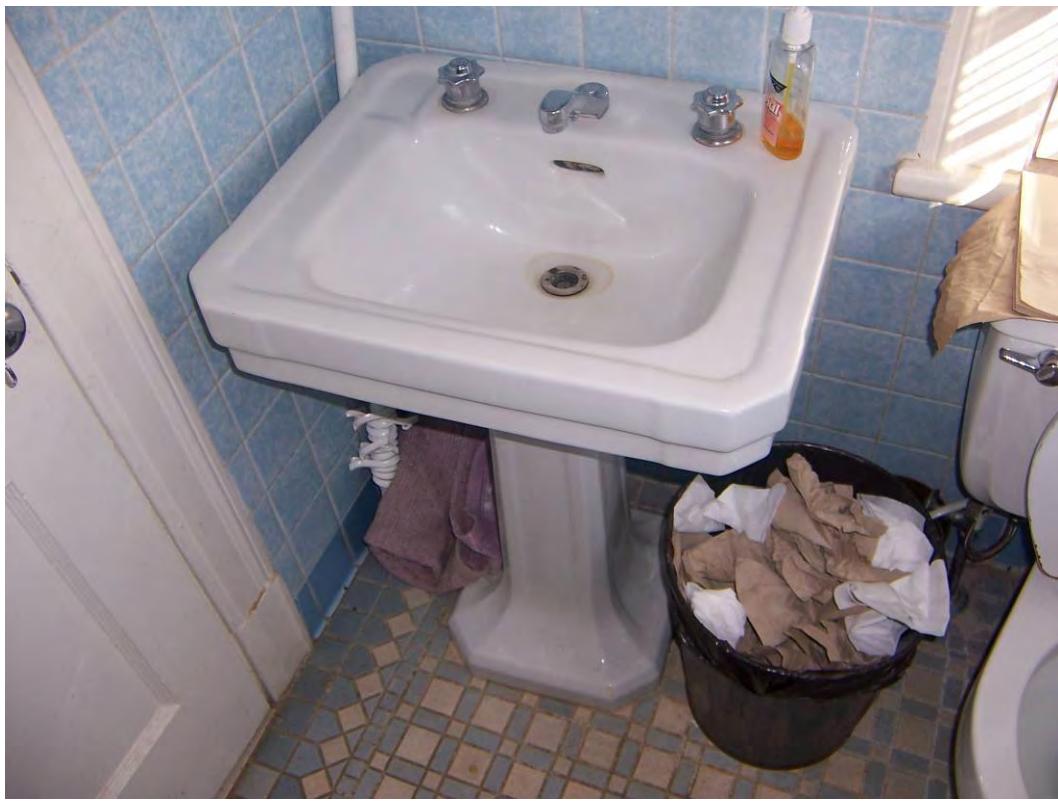


Figure 162. Original sink and tile floor in second floor bathroom.

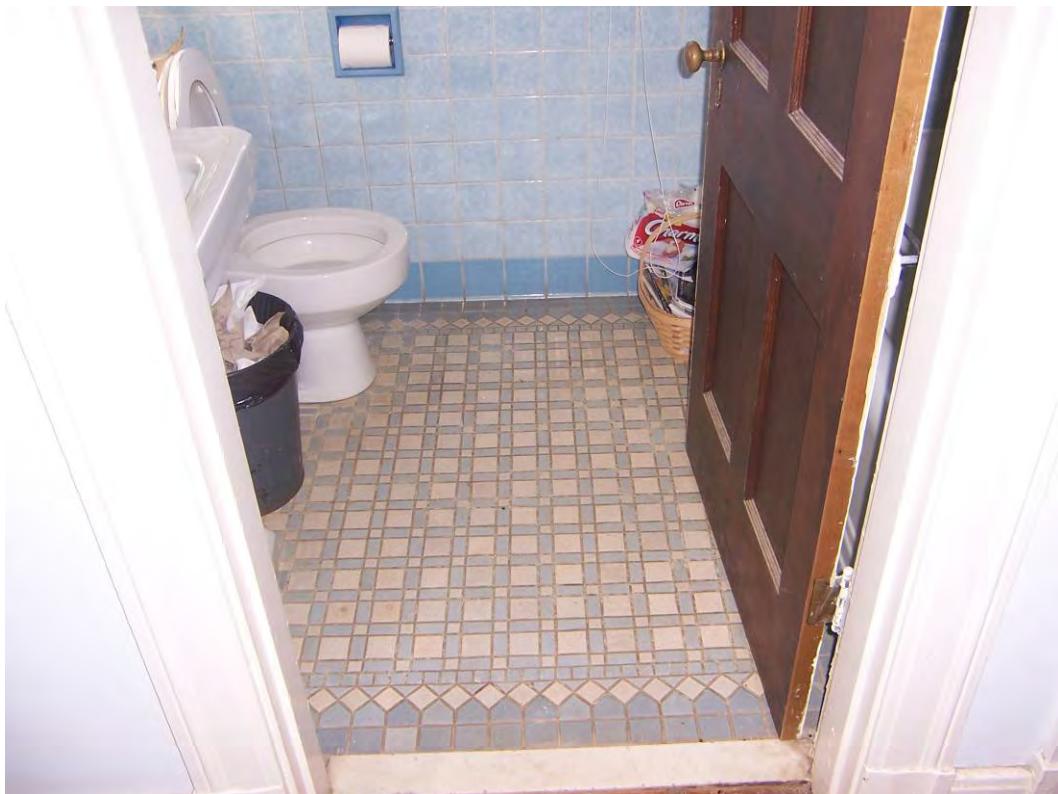


Figure 163. Original tile floor in second floor bathroom.

**TREATMENT RATING 1: PRESERVE.****Statement of Importance:**

- The bathroom fixtures and tilework are associated with those qualities for which the Childers House was designated a historic property, and
- the bathroom fixtures and tilework contribute to the significance and historic appearance of the Childers House, and
- the bathroom fixtures and tilework are distinctive and has a high level of historic integrity.

**Condition:      *Good – Preserve***

Fair to good - Preserve

Poor - Preserve

**INVENTORY QUANTITY AND CONDITION**

The bathroom fixtures are evaluated as Good when:

- the bathroom fixtures and tilework are intact and in good condition, and
- cleaning and repair of the bathroom fixtures and tilework will result only from professional recommendation, and
- any repair or maintenance of the bathroom fixtures and tilework are to be executed by a qualified professional.

**ELECTRICAL**

Figure 164. Replacement light fixture in entrance hallway.



Figure 165. Original light fixture in living room.



Figure 166. Replacement light fixture in upstairs hallway.

**TREATMENT RATING 4: PRESERVE WHERE THERE IS NO COMPELLING REASON FOR REMOVAL.**

**Statement of Importance:**

- The lighting is not original to the construction of the house; however, it does not detract from the historic elements of the Childers House.

**Condition:** *Good – Preserve*

Fair to good - Preserve

Poor – Replace with lighting more appropriate to the colonial re-vival period.

**INVENTORY QUANTITY AND CONDITION**

The lighting fixtures are evaluated as Good when:

- the electrical is intact and in good condition.

# CLEANING ORNAMENTAL BRONZE LIGHT FIXTURES<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**16510-03**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on cleaning existing interior ornamental bronze lighting fixtures.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  1. Safety Precautions
  2. Historic Structures Precautions
  3. Submittals
  4. Quality Assurance
  5. Delivery, Storage and Handling
  6. Project/Site Conditions
  7. Sequencing and Scheduling
  8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the CRM.

## PART 2---PRODUCTS

### 2.01 MATERIALS

- A. Mild Soap: Ivory or a mild detergent with pH of approximately 8.0.
- B. Cloth: Clean cotton waste.
- C. Clean, potable water.

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Erect a stable working platform, which will allow easy access to all elements of the lighting fixture and its hangers. Support fixture so that no additional pressure will be placed on its hangers during the cleaning operation.
- B. Remove all bulbs and removable glass elements. Clean with a mild soap and water. Rinse and dry thoroughly.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- C. Clean glass elements which cannot be safely removed inside and out. Using a small nozzle, carefully vacuum dirt from the inside of the fixture and wash the glass with a mild soap and water, rinse thoroughly with clear water and dry with a clean, soft cloth.
- D. Cleaning Metal Framework and Hangers: Wash, clean and oil all the bronze elements of the fixture. For guidance on cleaning, oiling, polishing, and patinating, see 05010-01-R and 05010-22-R.

**END OF SECTION**

## HARDWARE



Figure 167. Original doorknob in kitchen.



Figure 168. Original doorknob and lock in first floor bedroom.



Figure 169. Replacement doorknob in first floor bedroom.



Figure 170. Original cabinet door pulls on hyphen cabinets.

## TREATMENT RATING 1: PRESERVE.

### Statement of Importance:

- The hardware is associated with those qualities for which the Childers House was designated a historic property, and
- the hardware contributes to the significance and historic appearance of the Childers House, and
- the hardware is distinctive and has a high level of historic integrity.

### Condition:     *Good – Preserve*

Fair to good - Preserve

Poor - Preserve

## INVENTORY QUANTITY AND CONDITION

The hardware is evaluated as Good when:

- the hardware is intact and in excellent condition, and
- any repair or maintenance of the hardware is executed by a qualified professional.

**PLASTER**

Figure 171. Plaster damage in northeast first floor bedroom.



Figure 172. Plaster damage in northeast first floor bedroom.



Figure 173. Plaster damage in stairwell down to garage from kitchen addition.



Figure 174. Cracking plaster wall in upstairs closet.

**TREATMENT RATING 1: PRESERVE.****Statement of Importance:**

- The plaster throughout the house is associated with those qualities for which the Childers House was designated a historic property, and
- the plaster contributes to the significance and historic appearance of the Childers House, and
- although the plaster is not distinctive, it does have a high level of historic integrity.

**Condition:      *Good – Preserve***

Fair to good - Preserve

Poor - Preserve

**INVENTORY QUANTITY AND CONDITION**

The plaster is evaluated as Good when:

- the plaster is intact and in good condition, and
- any repair or maintenance of the plaster is executed by a qualified professional.

# THREE-COAT PLASTER PATCHING HOLES<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**09210-03**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### 1.01 SUMMARY

- A. This procedure includes guidance on patching holes in plaster. The extent of work described includes the following:
  - 1. Removing deteriorated plaster, and
  - 2. Applying three coats of plaster to the damaged area.
- B. Most buildings built before 1914 had hair plaster (plaster with animal hair mixed in to provide greater strength); Plaster installed after 1914 may have a fiber bonding agent rather than animal hair...or, it may have no bonding agent at all.
- C. Complete failure of plaster, requiring a three-coat plaster patch, is usually localized around doors and windows, on stair soffits or areas severely damaged by water infiltration.

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the CRM.

## PART 2---PRODUCTS

### 2.01 MANUFACTURERS

- A. U.S. Gypsum Association  
810 First Street NE, #510  
Washington, DC 20002  
202/289-5440, FAX 202/289-3707
- B. Tuff-kote Company, Inc.  
210 Seminary Avenue  
Woodstock IL 60098  
815/338-2006

### 2.02 MATERIALS

- A. Metal Lath
- B. 18 Gauge Tie Wire and Drywall Nails
- C. Scratch and brown coats: Perlite gypsum plaster, such as "Structo-Lite" (U.S. Gypsum Co.), or approved equal.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- D. Finish Coat Gauging Plaster, Finish Lime
- E. Drywall screws
- F. Cloth mesh tape
- G. Joint compound such as "Durabond Wallboard Compound" (U.S. Gypsum Co.), "Krack-kote" (Tuff-Kote Co.), or approved equal.

## 2.03 EQUIPMENT

- A. Hawk
- B. Slicker (flexible straight-edge)
- C. Plasterer's trowel
- D. Margin trowel
- E. Mortarboard and mudpan
- F. Pointing trowel
- G. Plywood scrap
- H. 6 inch taping knife
- I. 12 inch taping knife
- J. Joint tape (cloth mesh preferred)
- K. Stiff putty knife
- L. Goggles, work gloves, and dust mask
- M. Hammer and cold chisel
- N. Needlenose pliers and wire cutter
- O. Screwgun and drill
- P. Spray bottle and dropcloths
- Q. Tin snips
- R. Shop-vac
- S. Paint brush

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Determine the extent of unsound plaster and evaluate work requirements and causes before proceeding. Signs of damaged plaster in need of replacing include:
  - 1. Holes
  - 2. Water Stains: Brownish rings on the plaster, especially the ceilings, indicate that the plaster has been wet. If the water was stopped quickly, the surface may only need to be sealed with pigmented shellac to prevent the stain from bleeding through the new paint or wallpaper. However, if the leak continued for a long period, the plaster may need to be replaced, and will often have a powdery appearance.
  - 3. Chipping, flaking and delamination of plaster due to water infiltration.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Removing Deteriorated Plaster:
  - 1. Use plaster washers to re-secure weakly-keyed areas of otherwise sound plaster to the wall or ceiling (see 09210-04-R "Resecuring Loose Wall or Ceiling Plaster").
  - 2. Wear a dust mask, goggles and gloves and pull loose plaster from the walls with your hands or a flat prybar.
  - 3. To remove sound plaster, drill holes in the line of cut with a carbide drill bit; Holding the chisel at a shallow angle, carefully cut directly from hole to hole with a cold chisel; Cut the resulting plaster free from the lath by chipping the keys from the side.
  - 4. Cut the plaster back to the studs, if necessary, and re-secure the lath with drywall nails.

5. Knock any plaster stuck between the lath back into the wall cavity.
6. Vacuum all dust, loose plaster, and other debris from the hole with a shop-vac, or brush it out with an old paintbrush.

B. Lathing the Hole:

1. Install metal lath over the wood lath (metal lath lessens the likelihood of cracking caused by the old wood lath drawing too much moisture out of the plaster).
2. If 2 hands are necessary to secure new metal lath, drive a finishing nail into an exposed stud; take a piece of lath slightly larger than the hole and hang it on the nail; with both hands now free, cut the lath to shape with tin snips.
3. Use tie wire to secure the metal lath over the wood lath.
4. To make a tie wire, bend a 6 inch long piece of wire into an elongated "U" and pull it around the old wood lath; space the tie wires every 6 inches.
5. To secure the lath at studs, drive 1 inch drywall screws between the lath into the stud.

C. Applying the Scratch and Brown Coats:

1. Thoroughly moisten the old wood lath with a spray bottle, so it will not draw moisture out of the wet plaster used for patching.
2. Apply the base coat (scratch coat) of plaster to the wall in an arching motion; Keep the hawk close to the wall under the trowel to catch falling plaster; Use a margin trowel to work the plaster into edges and corners. The thickness of the new scratch coat should not exceed that of the old scratch coat (about 1/8 to 1/4 inch).
3. As it starts to set, score shallow, random scratches in it diagonally about every inch or so to provide keys for the next layer; Let the scratch coat set for 48 hours.
4. Apply the second coat (brown coat) using the same plaster that was used for the scratch coat.
5. Run a slicker (a long flexible straight edge) over the entire patch; Keep the brown coat below the level of the surrounding finish coat by about 1/8 inch.
6. As the brown coat starts to set, knock off any high spots; Let the brown coat set for 48 hours before applying the finish coat.

D. Mixing the Finish Coat:

1. Place approximately 2 quarts of cold, potable water into a 5 gallon plastic bucket.
2. Scoop in autoclave finish lime until it starts to float. NOTE: WEAR GOGGLES, A DUST MASK OR RESPIRATOR, AND LATEX GLOVES WHEN MIXING LIME.
3. If using single-hydrated lime, sift it into the water the day before and leave to slake overnight.
4. Mix thoroughly with a mixer attachment on an electric drill, or by hand with a pointing trowel.
5. Add small amounts of water or lime as necessary until all the lime is wet and there are no lumps or standing water.
6. Use a scrap of plywood for a mortarboard and toss some lime putty onto it.
7. Form the putty into a ring using the margin trowel; Fill the center of the ring about 2/3 full with cold, clear water.
8. Slowly sprinkle in gauging plaster until all the water is absorbed; The mix should consist of 1 part gauging plaster to 3 parts lime putty.
9. Mix the water and the plaster in the middle of the ring; It should be slightly stiffer than the lime putty.
10. Fold in the lime putty and mix until all of the ingredients are stirred up.

E. Applying the Finish Coat:

1. If applying the finish coat over an old brown coat, the existing brown coat must be moistened well before applying the finish coat (unnecessary on a newly-applied brown coat).

NOTE: Finishing plaster over an old brown coat occasionally fails because the new plaster does not bond to the dry, old substrate, even if it is wet down. Furthermore, the old plaster will absorb water faster, causing cracks in the finish coat as it starts to dry.

2. Following the same motions used when applying the first two coats, trowel the finish coat onto the patch.
3. Fill in any hollows by dabbing with plaster and smooth out ridges.
4. Spray a fine mist of water onto the plaster and trowel over the patch again to get a slick finish; Straighten edges and corners with margin trowel.
5. Let the finish coat cure for about 1 week; Check it for shrinkage.
6. Tape any small cracks with cloth mesh tape and joint compound.

- F. Wash down new plaster with a zinc sulphate solution (2 lbs./gallon of water) and allow to dry.

3.03 ADJUSTING/CLEANING

- A. Remove all rubbish and debris caused by plastering work.
- B. Clean all affected surfaces of room and furnishings to their prior condition.
- C. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces that are not to be plastered. Repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers, and equipment and clean floors of plaster debris.

**END OF SECTION**

## PATCHING SMALL CHIPS AND CRACKS IN PLASTER<sup>1</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**09210-03**

**The Cultural Resources Manager, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### **PART 1---GENERAL**

#### **1.01 SUMMARY**

- A. This procedure includes guidance on patching small chips, cracks or depressions in plaster surfaces.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the CRM.

- C. For guidance on repairing hairline cracks, see 09210-02-R; for guidance on repairing large holes, see 09200-12-R and 09210-03-R.

#### **1.02 REFERENCES**

- A. American National Standards Institute (ANSI) Standard Specifications: ANSI, 1430 Broadway, New York, NY 10018.
- B. American Society for Testing and Materials (ASTM) Standard Specifications: ASTM, 1916 Race Street, Philadelphia, PA 19103-1187, 215/299-5400.

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## PART 2---PRODUCTS

### 2.01 MANUFACTURERS

- A. U.S. Gypsum Association  
810 First Street NE, #510  
Washington, DC 20002  
202/289-5440, FAX 202/289-3707

### 2.02 MATERIALS

- A. Gypsum Plaster Materials:
  - 1. General: gypsum plastering materials shall conform to ANSI A42.1. Provide neat or ready-mixed materials at installer's option unless indicated otherwise.
  - 2. Base coat plaster: Perlite gypsum plaster such as "Structo-Lite" (U.S. Gypsum Association), or approved equal.
  - 3. Base coat aggregate: Sand.
  - 4. Finish coat plaster: Keene's cement.
  - 5. Finishing lime: Type is installer's option.
- B. Bonding Materials: Bonding agent shall conform to ASTM C631.

### 2.03 EQUIPMENT

- A. Joint knife
- B. Sponge or heavy-nap cloth
- C. Crack widener or triangular can opener
- D. Stiff bristle brushes
- E. Hawk
- F. Slicker (flexible straight-edge)
- G. Plasterer's trowel
- H. Margin trowel
- I. Mortarboard and mudpan
- J. Pointing trowel

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Scrape loose or damaged finish plaster and peeling paint from surface with chisel or joint knife. Remove material where required to enlarge cracks, chips, holes, etc. to at least 1/2 inch across and undercut to improve bonding of new material.
- B. Brush or vacuum surface to remove dust and debris.
- C. Moisten the surface by lightly spraying a fine mist of clean water from a spray bottle.
- D. Apply skim finish coat over low areas to bring entire finished surface out flush with the projecting firm and sound layers of adjacent plaster or paint. Form plaster as required to match original configuration and design or ornamental plaster.
- E. Once dry, sand by hand to produce a surface without bumps, cracks or depressions, ready to receive finish treatment.

### 3.02 ADJUSTING/CLEANING

- A. Upon completion of this work, all floors, walls and other adjacent surfaces that are stained, marred, or otherwise damaged by work in this procedure shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.
- B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the CRM.

**END OF SECTION**

## **5 MAINTENANCE LOG**







## 6 SOURCES

- Adams, Denise Wiles. *Restoring American Gardens; An Encyclopedia of Heirloom Ornamental Plants 1640-1940*. Portland, OR: Timber Press. 2004.
- Chanchani, Samiran. Eligibility Assessment of Childers House, Building 6081, Ft. Campbell, Kentucky. Prepared for: USACE Louisville District, Louisville, KY. Prepared by: Cincinnati, OH : BHE Environmental, Inc. 2003.
- Chicago Tribune. *Chicago Tribune Book of Homes*. Chicago: The Chicago Tribune. 1927.
- Grant, John A. and Carol L. *Garden Design Illustrated*. Seattle, WA: University of Washington Press. 1954.
- House Beautiful. *The House Beautiful Gardening Manual*. Boston, MA: The Atlantic Monthly Company. 1926.
- \_\_\_\_\_. "Shrubs that Won't Grow Up" *House Beautiful*, December 1937.
- \_\_\_\_\_. "Choosing Trees for the Small Garden", *House Beautiful*, November 1937.
- \_\_\_\_\_. *House Beautiful*, July 1937.
- Johnson, Leonard H. *Foundation planting*. New York: A. T. De La Mare Company. 1927.
- Reiff, Daniel D. *Houses from Books: Treatises, Pattern Books, and Catalogs in American Architecture, 1738-1950, A History and Guide*. University Park, PA: Penn State Press. 2000.
- Stevenson, Katherine Cole and H. Ward Jndl. *Houses by Mail: A Guide to Houses from Sears Roebuck and Company*. Washington, DC: National Trust for Historic Preservation. 1986.
- Willis, Royal Barry. *Houses for Homemakers*. New York: Franklin Watts, Inc. 1945.

## WEB SOURCES

The Secretary of the Interior's Standards for Rehabilitation

<http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

U.S. General Services Administration (GSA)

<http://w3.gsa.gov/web/p/hptp.nsf>

# REPORT DOCUMENTATION PAGE

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<b>13. SUPPLEMENTARY NOTES</b> Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.						
<b>14. ABSTRACT</b> <p>The Childers House is located at Fort Campbell, Kentucky (the house is located in Montgomery County, Tennessee). The Childers family built the house during the years of 1938 and 1939. The cultural resources firm of Dennison and O'Malley found the building ineligible for National Register of Historic Places (NRHP) nomination in 1977, determining that the house did not meet the NRHP Criteria. A more detailed report in the 1990s concurred with the 1977 evaluation; however, in 1997, the Tennessee State Historic Preservation Officer (SHPO) made a determination that the Childers House appeared to be eligible for listing on the NRHP under Criterion C: architecture due to a resemblance to Gunston Hall, Virginia. The Fort Campbell Integrated Cultural Resources Management Plan (ICRMP) recommended a complete documentation and re-evaluation of the building.</p> <p>This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Fort Campbell Cultural Resources Office and Directorate of Public Work in managing this historic building.</p>						
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